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UNDER THE GENERAL EDITORIAL CHARGE OF
CHARLES L. MIX, A. M., M. D.

PROFESSOR OF PHYSICAL DIAGNOSIS IN THE NORTHWESTERN
UNIVERSITY MEDICAL SCHOOL

VOLUME VIII
MATERIA MEDICA AND
THERAPEUTICS

EDITED BY
GEORGE F. BUTLER, PH.G., A.M., M.D.
EMERITUS PROFESSOR OF THERAPEUTICS, CHICAGO COLLEGE OF
MEDICINE AND SURGERY, CHICAGO, ILL.

PREVENTIVE MEDICINE

EDITED BY
WM. A. EVANS, M.S., M.D., LL.D., PH.D.
PROFESSOR OF PREVENTIVE MEDICINE, NORTHWESTERN UNIVERSITY
MEDICAL SCHOOL

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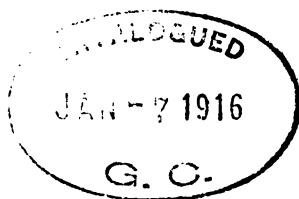


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MATERIA MEDICA AND THERAPEUTICS.

DRUGS.

INTRODUCTION

In Part I, the drugs are arranged alphabetically, so far as practicable, but there are a few exceptions. For example, under "Arsenic" will be found all arsenic salts and derivatives of arsanilic acid, including atoxyl, salvarsan (arsenobenzol), neosalvarsan, and substitutes therefor. Under "Iodine and Its Compounds" the iodine derivatives and the iodides will be found, and under "Salicylic Acid" are the salicylates and aspirin—acetyl-salicylic acid. Ethylhydrocuprein—Optochin—is a quinine derivative and will be found under "Quinine."

ACONITE.

Aconitine in Recurrent Rheumatic Iritis. M. F. de la Cruz¹ reports a case of rheumatic iritis recurring every winter for twelve years in a man aged 35 years which resisted the internal administration of anti-rheumatic remedies and local applications, but yielded readily and permanently to the internal use of aconitine.

ALCOHOL.

Alcohol Injection Into the Superior Laryngeal Nerve. Sobotky² states that the blocking of the internal laryngeal nerve, the internal branch of the superior laryngeal nerve, gives the greatest and most prominent relief to

(1) Rev. Med. y. Cirug. Pract., Jan. 7, 1916.

(2) Boston Med. and Surg. Jour., Jan. 21, 1915.

the sufferer from advanced tuberculosis of the larynx. The technique is as follows: Place the patient in a recumbent position. Using the usual aseptic precautions, locate by pressure the tender spot where the nerve pierces the thyrohyoid membrane, usually at the upper edge of the thyroid cartilage and one-third the distance from the outer edge. Introduce a somewhat blunted needle about 1.5 cm. into this point at right angles to the skin. Should the patient cough, the needle is in the lumen of the larynx and must be withdrawn. He must be forbidden to talk or to shout and told to signify ear pain by raising his hand. If the introduction of the needle has produced no discomfort, turn it upward and outward toward the ear, and if this does not produce intense pain move the needle cautiously in various directions until the pain, referred to the ear, is produced. The instant the patient shows he is in pain, push the piston of the syringe slowly and allow only one or two drops of the 85 per cent. solution of alcohol to escape.

In successful injections there is little inflammatory reaction about the site. The pain on swallowing disappears and does not return for anywhere from ten days to three months. If both right and left internal laryngeal nerves are to be injected, as is usually necessary, it is best to wait two or three days between injections.

Alcohol for Burns. M. J. Breitmann³ has found immediate application of 60 or 70 per cent alcohol superior to all other remedies in burns of the first or second degree. When the blisters have not been opened the alcohol does not smart but the pain is relieved, the blisters retrogress and healing proceeds aseptically. Alcohol above or below this strength does not act so favorably, he asserts.

Alcohol Injections In Pruritus Ani. The success of alcohol injections for producing localized lasting anesthesia, in facial and other forms of neuralgia, suggested to H. B. Stone⁴ the application of the same principle to the abolition of unpleasant sensations from the anal and peri-anal regions. The method has been tried in seventeen cases. There is not much pain associated with the

(3) *Therap. Monats.*

(4) *Bull. Johns Hopkins Hosp.*, August, 1916.

injection. There is some soreness during the first twenty-hour hours, after which the only subjective sensation remarked is numbness. The itching is immediately abolished and the area injected is largely or completely anesthetic. No case so far has shown the slightest evidence of disturbance in the action of the sphincter. One patient returned for a second injection, eight months after the first, for a recurrence of itching.

The area in which the itching is complained of is carefully noted. Under general or local anesthesia, the injection is then made so that this whole area is anesthetized. The needle is carried entirely through the skin vertically and then is inclined sharply to the side so that it lies nearly parallel to the skin surface. This method accomplishes practically the same thing as the operative treatment for pruritus, and is indicated in those cases of great intensity in which the usual measures have failed.

Alcohol Injections in Sacral Neuralgia. Surraco⁵ refers to the agonizing pains in the sacral region in the course of cancer in the bladder, prostate or urethra. He places the patient under the influence of scopolamine and morphine and then injects the alcohol through the holes in the sacrum to act on the second, third and fourth nerves. The second hole is on a horizontal line about 2 cm. below the posterior superior iliac spine. The other holes are about 2 and 4 cm. below this, about 2 cm. from the line of the spinous processes. The needle is introduced for 0.5 cm. and 2 c.c. of alcohol are injected in each hole, each side of the median line. In four extremely severe cases of neuralgia from cancer in the bladder or prostate a single sitting banished the neuralgia permanently during the three or five months to date in three cases. A second injection was required in the other.

APOMORPHINE.

Two Cases of Swallowed False Dentures Treated With Apomorphine. Gerstein,⁶ a marine surgeon, reports the case of a stoker who swallowed a plate with four

(5) Jour. d'Urol, October, 1915.

(6) Münch. med. Wochenschr., Oct. 19, 1915.

incisor teeth in his sleep. The object could neither be seen nor felt with forceps. Three hours previously, the man had eaten heartily. The author at once gave him an injection of apomorphine and placed him in the best possible position for vomiting (prone position, neck stretched and forehead supported). In five minutes came the first retch. The next brought away the teeth. Vomiting lasted twelve minutes. The second case was a duplicate of the first.

ARGENTUM.

Treatment of Meningitis With Silver Preparations.

The close resemblance between the meningococcus and gonococcus is noted by Wolff,⁷ the latter being sensitive toward silver salts. The gonococcus, in rare instances, can cause spinal meningitis. *In vitro* the meningococcus is equally vulnerable to silver, and recently weak protargol solutions have been injected into the spinal cord in cases of meningitis. Wolff, using a most elaborate technique, has sought to perfect this method of treatment. Much care was taken to prevent pain and irritation, and ether preceded by lumbar analgesia, which was designed to prevent irritation by the silver, was not always successful. In any case the irritative effects of the silver were not prohibitive, and the salt appeared to diffuse rapidly through the cerebrospinal fluid. The patients, who of course were suffering from meningitis, found the injections burdensome, but this counted for little in so deadly a disease. There were two possibilities, viz.: death of the meningococcus and the arrest of its proliferation. The author treated in all five cases of a disease of which normal mortality is from 30 to 70 per cent., and all cases ended in recovery. Four cases were of medium and one of extreme gravity. Apparently no serum was given.

The author's theory is as follows: Epidemic cerebrospinal meningitis is above all a local infection. In this respect it is radically different from certain hematogenous forms (tuberculous, pneumococcus). The germ

(7) Deutsche med. Wochenschr., Dec. 9, 1915.

reaches the cerebrospinal fluid by means of the lymphatic connections between the nasopharynx and the meningeal sac. Only in very rare exceptions do we find cocci in the blood (*meningococcus sepsis*) with secondary implication of the meninges.

The use of protargol in this connection is based solely on the analogy of the *gonococcus* with the *meningococcus*, so that it is not impossible that a better bactericide may be discovered in time.

Therapeutic Action of Colloidal Silver. Bersch⁸ thinks this remedy for sepsis much undervalued in textbooks. Recently, in a base hospital, he tested it on a subject who was thought to have pneumonia, but was really suffering from typical sepsis. The symptoms were headache, thirst, and exhaustion; fever with typical septic curve—violent chills, followed by fever of 40° C., sinking at times as low as 35.8°, with profuse perspiration—lasting three weeks. The chill, rise, fall, and sweating occurred daily, beginning in the afternoon. The subject showed evidence of septic endocarditis, pulse 160, feeble. The principal treatment was digitalis for the heart, but the response of the latter was becoming less marked. Under intravenous injection of colloidal silver the symptoms changed for the better and the patient made a slow but complete recovery.

Therapeutic Use of Colloidal Silver. Voigt⁹ seeks to find a criterion which will remove this substance from the "*post hoc*" class, for in practice thus far it has been impossible to state whether or not it really cures septic conditions. It can not long remain in the circulating blood and is deposited in the liver, spleen, and bone marrow in which it maintains a certain relationship to the blood as it passes through them. For a considerable interval, however, it persists in the blood in a very low but apparently constant concentration, and may be able to exert an ionic or catalytic action. It is evident that little, if anything, is to be gained by injecting it in high concentrations. A 0.5 per cent. solution should suffice, with total disregard of isotonicity. If the

(8) Münch. med. Wochenschr., Nov. 23, 1915.

(9) Münch. med. Wochenschr., Sept. 14, 1915.

particles are of a sufficient size capillary embolism can result.

There is no doubt that at times it acts brilliantly in septic and pyemic conditions. It is essential that it be given early, although Voigt saw one remarkable cure of pyemia when the drug was given as a last resort. There is no doubt of its value in selected cases, although this author does not lay down any postulates for selection. The ointment has a field in local infections.

Collargol in Sepsis and Acute Rheumatism. Reichmann,¹⁰ who had good results several years ago, has within the past year used collargol systematically in sepsis. The first case was one of proved streptococcus sepsis in a child aged 12, following measles. A hematogenous meningitis was one of its manifestations. Collargol was injected with no decisive result. After a brief favorable course of the disease high fever and polyarthritides developed. One wrist was about to suppurate when collargol was given in a vein with astonishing results. Renewed exacerbations made several other injections necessary, but the patient recovered. In the second case in a young child, an otogenous meningitis first developed. The occurrence of bacteria in the blood was very doubtful, but collargol was given for supposed bacillemia, and seemingly with the best consequences. The power of the drug over the fever curve was undoubted. The third case treated was of obscure nature. One lower extremity was swollen to double the natural size, there was marked anemia, the nutrition was miserable, and high fever was present. Blood cultures showed staphylococci and collargol was given intravenously. The temperature curve responded decisively. In the belief that pernicious anemia existed both salvarsan and Fowler's solution were given without much influence on the blood count. The femoral thrombosis gradually underwent involution. The fourth case is very briefly described. The bacteriemia was hypothetical, the supposition being that a septic process had developed after measles in a 2-year-old child. In the two fatal cases there was evident bacillemia due to staphylococci.

(10) Münch. med. Wochenschr., Dec. 14, 1915.

ARSENIC AND ITS DERIVATIVES.

Action of Arsenicals on the Adrenals. Wade H. Brown and Louise Pearce¹ have tested the action of arsenical compounds on male guinea-pigs weighing from 400 to 500 grams, and also on rabbits and dogs, which were used in order to facilitate intravenous administration of the drugs. The compounds tested comprised arsenious and arsenic acids, sodium cacodylate, atoxyl, arsacetin, arseno-phenylglycine, salvarsan, and neosalvarsan. Sterile solutions of the substances were injected intraperitoneally.

After some important observations on the histology of the normal adrenals of guinea-pigs, which differs markedly in black and in white animals respectively, the following conclusions are presented:

1. Toxic doses of all arsenicals of which they have knowledge produce definite pathologic changes in the adrenals of guinea-pigs. These include congestion, hemorrhage, disturbances in the liquid content, cellular degenerations and necroses, and reduction in the chromaffin content.

2. The character and severity of the injury produced by different arsenicals varies with the chemical constitution of the compounds.

3. From these facts they believe that adrenal injury is an important factor in arsenical intoxication, and suggest that therapeutic doses of some arsenicals may produce adrenal stimulation.

Arsenic Compounds in Tuberculosis. The clinical reports in the literature as summarized by Arkin and Corper² show that arsenic has not been demonstrated to have any specific action in tuberculosis, and that its value in this disease can be attributed only to its favorable effects on metabolism. Furthermore, in advanced tuberculosis it may even be harmful. In order further to determine the effect of arsenic compounds on the tubercle bacillus, and their value in the treatment of tuberculosis, the authors investigated the tuberculocidal action of sodium arsenite, sodium cacodylate, mercury cacodylate, atoxyl, arsacetin, and neosalvarsan, and have

(1) Jour. Exp. Med., November, 1915.

(2) Jour. Inf. Dis., April, 1916.

sought to determine whether or not these compounds enter the tissues of the tuberculous animal.

An emulsion of human tubercle bacilli was treated at 37° C. with various dilutions of each arsenic substance for a period of twenty-four hours. They found that sodium arsenite in dilutions of from 0.1 to 0.0001 per cent. has no germicidal action on the tubercle bacillus *in vitro* in twenty-four hours at 37° C. Sodium cacodylate in dilutions of from 2 to 0.002 per cent. has no germicidal action on human tubercle bacilli *in vitro*. Mercury cacodylate in dilutions up to 0.001 per cent. has a germicidal action on human tubercle bacilli. The fact that sodium cacodylate has no tuberculocidal action indicates that the mercury cacodylate owes its effect to the presence of the mercury in the molecule. Atoxyl arsacetin and neosalvarsan in dilutions of from 1 to 0.001 per cent. have no germicidal action on human tubercle bacilli *in vitro*. The presence of arsenic in tissues of injected animals was also investigated by Arkin and Corper.

As a result of their experiments the authors noted that arsenic in simple crystalline salt form, as sodium arsenite, sodium cacodylate, atoxyl, arsacetin and neosalvarsan, administered to tuberculous animals parenterally is found in the liver, lungs, kidneys, blood, spleen, and tuberculous tissues (lymph glands of guinea-pigs and eye of rabbit), the concentrations in the various tissues not greatly differing. No evidence of accumulation in the tuberculous tissues was obtained.

Incidentally, since tin forms salts like arsenic, in which the tin is in the negative radical, experiments were performed to test whether sodium stannate was germicidal toward the tubercle bacillus. It was found that even in concentrations as high as 1.0 per cent. for forty-eight hours at 37° C. it is non-germicidal toward the human tubercle bacillus; no evidence even of attenuation was observed.

SALVARSAN AND NEOSALVARSAN.

Toxicity of Salvarsan Preparations. According to Brandweiner,⁴ experience indicates that salvarsan-

(4) Wien. klin. Wochenschr., Dec. 30, 1915.

sodium is somewhat more toxic than neosalvarsan. In his 14,000 injections of salvarsan or its preparations since the war began he is guided by the reaction to the first injection, regarding the slightest trace of headache as a reaction worthy of attention to individualize treatment. He never discharges a patient with "neuro-recurrence" until the cerebrospinal fluid gives normal findings. A tendency to sleeplessness and extreme sensitiveness to noises are among the by-effects of salvarsan which he regards as significant. These two symptoms often appear after the first injection and may persist for several days. He mentions a case of severe intoxication from salvarsan which was accompanied by persisting sleeplessness. Headache, sleeplessness and sensitiveness to noises are the mildest degree of the changes which in severe cases are manifested by hemorrhagic encephalitis. Other symptoms—fever, palpitations, etc.—he regards as of far less moment, but a toxic eruption after salvarsan calls for great caution. If any of the solution gets outside of the vein, the resulting pain can be relieved by a tourniquet, applied for from ten to twenty minutes at intervals of one or several hours as may be indicated.

Toxicology of Salvarsan. A fairly thorough though brief discussion of the chemistry of the product and the best methods of preparing solutions for administration is presented by W. H. Willcox and J. Webster.⁵ They also include neosalvarsan and call attention to the greater instability of the latter and the need of avoiding heat above 200° C. during its preparation.

In the majority of cases only slight symptoms follow and comprise nausea, vomiting, slight rise in temperature, slight headache, and mild diarrhea. Shock is rare, and uncomplicated high fever is sometimes observed.

The more severe symptoms are of two types: Those of arsenical poisoning include rigor, headache, pains in the extremities, nausea, vomiting, furred tongue, diarrhea, injected conjunctivae, erythema, and slight jaundice. There may be some delirium followed by stupor, and albumin and casts are found in the urine. The second type of severe symptoms are those of profound

(5) Brit. Med. Jour., April 1, 1916.

toxemia. They appear within three days of the injection and comprise collapse, mental disturbances, stupor, muscular twitching, pains in the abdomen and back, epileptiform convulsions, coma, and death.

The prognosis is usually bad. Albumin and casts appear in a scanty urine. The liver, heart, and kidneys show degenerative changes, and the symptoms are due to a profound auto-intoxication similar to uremia. Arsenic may be found in the blood for several hours after an intravenous injection of salvarsan and its excretion is slow by way of the urine and intestinal tract. Traces can be found in the urine as much as three weeks after a single intravenous dose. Arsenic is not found post-mortem in the brain and central nervous system, but is present in most of the other structures of the body. The milk of nursing mothers does not contain arsenic after the administration of salvarsan. In the treatment of early intoxication the following mixture should be given in addition to the use of stimulants, the employment of venesection, and the repeated rectal administration of three drams of sodium bicarbonate in normal saline.

R.	
Sodii citratis	3i
Sodii bicarbonatis	
Potassii citratis	āā 3ss
Caffeinae citratis	gr. iij
Syrupi aurantii	3i
Aquae ad	3i
M.	

Salvarsan is contra-indicated in impaired renal function, advanced heart disease with failing compensation, serious bronchitis, and in most instances of advanced degenerative conditions in the central nervous system. Successive doses should not be given at intervals of less than four weeks, thus avoiding the dangers of cumulation owing to slow excretion.

Case of Salvarsan Poisoning. Eberly⁶ reports full details of a case in which a man, aged 36, without a clear history of syphilis, was found to be suffering from typical early tabes. Through an error, 0.6 gram of

(6) Jour. Amer. Med. Ass'n., Nov. 18, 1915.

salvarsan was mixed in 10 c.cm. of freshly distilled water, only a part of it dissolving. This unneutralized solution of salvarsan was injected into the right cephalic vein, and the patient almost immediately complained of a choking sensation and constriction of the pharyngeal muscles, and there was dyspnea, with small, weak, and rapid pulse. The needle was at once removed, about 5 c.cm. having been injected. Prostration, with cough, vomiting, and pain in the region of the left kidney, followed; 1/100 grain of nitroglycerine was administered by the mouth every twenty minutes until the pulse improved. Then there was suppression of urine, with general myalgia and phlebitis in the punctured vein, which became obliterated. Under alkaline therapy the toxic symptoms and anuria subsided almost immediately. Eberly did not feel sure that the marked toxic symptoms were due to the acidity of the solution or to the salvarsan independently of the reaction in this case.

Excretion of Salvarsan After Intravenous Injection of Concentrated Solutions. Stern⁷ made 420 examinations of urine from 200 persons who had received salvarsan in definite concentration in a vein. He found that under these conditions elimination goes ahead more slowly than when salvarsan is infused in dilute solutions. In theory as well as from the experience of clinicians, the longer the drug stays in the blood the better the therapeutic effects. The slow escape of residues of arsenic in the tissues is not concerned here, *i. e.*, there is no strict parallelism between the two. Weak reactions in urine tests should not necessarily be accepted as positive. One of the tests for salvarsan in the urine is addition of an alkaline solution of resorcin. When the drug is escaping in the desired quantity the resorcin in solution is colored a pronounced red and a red ring is formed. This can be interpreted as indicating the escape of the injected salvarsan from the blood. If this color reaction is feeble it has no significance in this connection.

Effect of Salvarsan and Neosalvarsan on the Bactericidal Power of the Serum. On the strength of the observation that the administration of salvarsan in syph-

(7) Deutsch. med. Wochenschr., April 6, 1916.

ilis exerted a beneficial action on secondary infections, S. R. Douglas and L. Colebrook⁸ undertook a series of experiments to determine the effect of salvarsan and neosalvarsan on the bactericidal power of human serum. Experiments *in vitro* showed that both drugs exerted a marked action in increasing the bactericidal action of both blood and serum. When salvarsan was administered to man and the blood tested for increase in bactericidal power, this was found wanting. Neosalvarsan, on the other hand, materially increased the bactericidal power of the blood after systemic administration. This effect, however, appeared promptly after the administration of the drug, reached its maximum in about one hour, and fell rapidly in the third or fourth hour. The bactericidal power was determined to be due probably to the presence in the blood of some arsenic compound, since heating to 60° C. failed to influence it, thus excluding the action of immune bodies. The authors suggest its possible value in the treatment of various septicemias, or of deep suppurating wounds.

Don'ts in Salvarsan Therapy. William E. Stevens⁹ presents us with the following list of "Don'ts."

Don't use salvarsan unless positive indications for its employment exist.

Don't expect as much from neosalvarsan as from salvarsan.

Don't give salvarsan in the office.

Don't give salvarsan at too frequent intervals, or in too small doses.

Don't omit any details in preparing the solution for injection.

Don't neglect to filter the solution before it is injected.

Don't cut down on a vein.

Don't inject any of the solution into the tissues surrounding the vein.

Don't administer too large a dose at the first injection, especially in the early secondary stages.

Don't inject salvarsanized serum prepared from Wassermann-positive blood into a canal containing Wassermann-negative fluid.

(8) Lancet, Jan. 22, 1916.

(9) Calif. State Jour. Med., July, 1916.

Don't inject air into the spinal canal.

Don't use intradural medication under any circumstances until the intensive treatment with intravenous injections of salvarsan, mercury inunctions or injections, and potassium iodide has been given a thorough trial.

Salvarsan Exanthem. Neisser¹ distinguishes between the "arsenic exanthem" and the exanthem due to a special idiosyncrasy, mostly of the urticaria type. The idiosyncrasy may be local from some preceding injury of the skin. This idiosyncrasy type is liable to appear each time salvarsan is given, but the tendency to the "arsenic exanthem" dies out with time. In two patients recently the acquired idiosyncrasy could be demonstrated at will by local application of a drop of the arsenic preparation, while mercury had no effect in this line. Some of his patients showing these two types of salvarsan exanthem had never been given mercurial treatment, or not for many years.

Five Years of Salvarsan Medication. E. A. Sainz de Aja² gives a record of 4,032 injections of salvarsan preparations. Of these, 1,552 were of salvarsan proper and 2,480 of neosalvarsan. The dose of salvarsan was from 0.1 to 0.6 gram, and that of neosalvarsan from 0.15 to 0.9 gram. The syringe is the best means of injecting neosalvarsan, while, on the other hand, intravenous apparatus is better suited for the administration of salvarsan. Also in using the newer sodium salvarsan, it is better given with an apparatus. The syringe recommended is that of Dieberg of 2 or 3 c.c. capacity with needles of nickel or platinum, sterilized by boiling, and washed with ether. Three preparations were used, the first of one in 500 c.c. of a serum solution rendered alkaline; the second, of one in 400 c.c. of serum; the third, a much more concentrated solution. At present the solution used is 1 per cent. in sterilized water which has been rendered neutral with sodium. It is important to use tubes containing only one dose, thus avoiding deterioration. In breast-fed infants a solution of 1 in 400 was injected in the infrascapular region. The injections

(1) Münch. med. Wochenschr., Jan. 25, 1916.

(2) Rev. de Méd. y Ciruj. Pract., Oct. 28, 1915.

were given in a series, one a week in a slightly alkaline solution. Sarcomas and epitheliomas were uninfluenced by these injections, as were Banti's disease and Malta fever. Lichen and psoriasis, which are always benefited by arsenic, are only temporarily relieved with a return of the lesions later. Cutaneous tuberculosis was undoubtedly much improved by this treatment, thus giving rise to confusion in diagnosis. It is important to begin the treatment of the pregnant mother in the midst of gestation in order that the child may be born free from syphilitic lesions. Tertiary lesions and specific neuropathies were not so frequently cured as secondary lesions.

Salvarsan in Primary Syphilis. A. A. Uhle and W. H. Mackinney¹ record their five years' experience with salvarsan in a series of fifty-seven cases seen in private practice. They have found that in spite of a large increase of syphilitic cases in private practice, there has been a gradual decrease in the number of chancres observed. This they attribute only to the extensive use of salvarsan or neosalvarsan in the treatment of syphilis. In this series the Wassermann reaction was never found positive in any chancre of less than seven days' duration, and was positive in every case examined after the fourteenth day. The earliest positive diagnosis of syphilis depends upon the demonstration of the *Trepanoma pallidum* in the expressed serum of a suspected sore. The Wassermann reaction is of value in the diagnosis, as a positive reaction means the onset of systemic syphilis, while a negative reaction for practical purposes means a local infection only. When energetic salvarsan or neosalvarsan treatment is introduced before the advent of a positive Wassermann reaction, a radical cure is the rule. After the Wassermann reaction is once positive, such uniformly good results can not be expected. When possible, excision of the chancre is a valuable addition to treatment.

Treatment of Syphilis With Copper Salvarsan. John Fabry and Johanna Selig² write that this preparation contains about 24 per cent. arsenic and 11.6 per cent. copper.

(1) New York Med. Jour., Jan. 1, 1916.

(2) Münch. med. Wochenschr., Feb. 2, 1915.

It is said to possess the following advantages over the other preparations of salvarsan: Smaller doses of arsenic are required to cause disappearance of the symptoms; the dose of arsenic being smaller, the injections can be given at shorter intervals; the patients tolerate the injections well and no untoward symptoms have been noticed.

The main objections to its use are: Preparation of the solution is very complicated and can be carried out only in a hospital; patients can not be treated ambulatorily, which is the aim in salvarsan treatment. The decrease in the Wassermann reaction is not so marked as when salvarsan is employed. It acts in all three stages of syphilis and is a remedy which influences syphilitic symptoms quickly and positively.

Case of Syphilitic Nephritis Treated by Salvarsan. N. MacDonald² reports a case which is very typical of early syphilitic nephritis in its clinical course. It is no longer open to question that syphilis in its early as well as in its larger stages may give rise to nephritis and, indeed, the dependence of one upon the other is probably more common than is generally appreciated. The nephritis in this case manifested itself about the fifth month after infection, which appears to be about the usual period, though it may be later or may be much earlier. In one reported case it occurred before the secondary roseola. The onset was insidious and without marked symptoms or derangement of health. The percentage of albumin in the urine tended to be very high, and the albumin came down on warming the urine long before the boiling point was reached, forming a voluminous and peculiarly white deposit even when the urine was high-colored. There was a great tendency to rapid and extensive dropsical effusion which cleared up with unusual rapidity. In this case, as in others reported, there was also pleural effusion. Throughout the case the patient's feeling of good health was quite out of proportion to the gravity of his symptoms. Even with extensive dropsy and great albuminuria he always averred he felt quite well, and he had none of the symptoms usually seen in nephritis from other causes. The blood-pressure

(2) *Lancet*, Sept. 25, 1915.

was not much raised except on one occasion. In late syphilitic nephritis the blood-pressure may be very high with extensive arterial degeneration. The treatment by salvarsan was adopted after due consideration, notwithstanding that albuminuria is said to increase the dangers of its administration, as mercurial and iodide treatment had failed. In several patients treated, salvarsan has not produced untoward effects when albumin was present. It was given with great care in small doses and so far has resulted in the disappearance of the Wassermann reaction.

Salvarsan and Mercury in Primary Syphilis. Salvarsan, in spite of occasional severe complications, is still the remedy *par excellence* for syphilis, says John Constat.⁴ In 1,161 cases in which salvarsan or neosalvarsan was administered, Constat had no more serious complications than slight fever, headache, vomiting occasionally, and a feeling of malaise. Observation of the eighteen cases reported, he says, demonstrates that from two to five injections are sometimes necessary to cure primary syphilis. At least six Wassermann tests with one provocative test should be made before a cure is expected.

Salvarsan-Mercury-Iodide Treatment of Syphilis. M. V. Zeissl⁵ reports a striking instance of the complete cure of syphilis by a single intramuscular injection of salvarsan (0.5 gram) given less than two months after infection. Four years later, a permanent cure was proved by the patient's acquiring a fresh infection. In general the treatment of syphilis should be undertaken as soon as possible after infection to avoid the consequences of the late stages and the parasymphilitic affections. The best treatment, Zeissl says, comprises the administration of repeated doses of 0.45 gram each of salvarsan, combined with injections of mercury succinimide or application of gray ointment and increasing doses of the iodides. In the majority of cases the combination is essential for the cure of the infection and confidence can not be placed entirely on any one of the drugs.

(4) Med. Record, Nov. 27, 1915.
(5) Berlin. klin. Wochenschr., Aug. 23, 1915.

Salvarsan in Tabes and General Paresis. Meijers⁶ reports his experience in this line with ten patients with parietic dementia, beginning with 0.15 gm. neosalvarsan and increasing to 0.45 or 0.6 to a total of from 4 to 4.2 gm. This was supplemented by mercurial treatment and potassium iodide, the course extending over two months. A slight increase in weight was apparent in a few, but aside from this there was no improvement in any way, and the course of the cases later did not differ in any respect from that of the patients not given this treatment. He reports another case in a man of 38 in whom the general paresis was suspected in its incipency by positive serologic findings in the cerebrospinal fluid when the man was being treated for an industrial accident and the fluid happened to be casually examined. He was given thorough treatment as above, but the paresis proceeded in its development later, unmodified in any way by the vigorous measures that had been applied in the effort to abort it.

Meijers' results in eight cases of tabes were far more encouraging. All but one patient displayed marked benefit from the treatment. It seemed to be as effectual when the neosalvarsan was injected intravenously as by the complicated Swift and Ellis technique, which he applied in five of the eight cases. No untoward by-effects were observed in any of the cases, and no change occurred in the cell content of the fluid nor in the Nonne albumin reaction. In the tabes cases, the pupil and Achilles tendon reflexes did not seem to be modified, but the distressing headaches and visceral crises were much benefited, as also the annoying incontinence of urine. The ataxia persisted unmodified, except in one case in which there was such improvement that the patient could get around the house.

Salvarsan in Treatment of Yaws. Before salvarsan was available the duration of yaws ranged between several months and several years. W. M. McDonald⁷ has used salvarsan in 400 cases; with the exception of two all the patients were completely cured by a single intramuscular injection; the two exceptions were cured by a

(6) *Nederlandsch Tijdschrift voor Geneeskunde*, January, 1916.
(7) *Lancet*, Sept. 18, 1915.

second injection. All the individuals were traced and examined at periods varying from a month to a year after the treatment and all were found to have remained cured.

Neosalvarsan in Tertian Malaria. Vandenhoff,⁸ incited by the results published two years ago by Baetger, has been treating malaria in Russian prisoners and German troops with intravenous injections of neosalvarsan. There is no doubt that plasmodium carriers were introduced into the Russian prisoner camps, for some of the men confessed to having had malaria. When mosquitoes were due, these carriers were isolated with screening material. Few cases of malaria developed, and most of these were tertian in type. No diagnosis was made unless the plasmodium was found in the blood. Fifteen of the patients were treated with neosalvarsan. The results were all that could have been asked, but perhaps not superior to those from quinine. The chief indications, then, are quinine intolerance and cases which are refractory to quinine.

Infantile Syphilis and Neosalvarsan. Thirteen infants who gave a pronounced Wassermann reaction, who had syphilitic symptoms or who were not thriving well, were given neosalvarsan by Neff⁹ at two weeks' intervals as nearly as possible. All the infants received the injection intravenously, usually in a vein of the scalp, otherwise in the external jugular. No untoward symptoms appeared from intravenous injection; thirty-three intravenous injections were made. In some instances the solution leaked out past the needle. In two cases the resulting infiltration left an indurated mass for two or three weeks, but no sloughing or suppuration occurred. Neff used the remedy dissolved in about 5 c.c. of freshly distilled water, injected slowly with a Luer syringe, and a three-quarter inch No. 20 to 22-gauge needle with short level.

A small area of the scalp is shaved, cleansed, and alcohol and iodine applied. In most instances Neff followed Holt's dosage of 0.075 gm. under 6 months of age, 0.15 over that age, although larger doses have been used at

(8) Münch. med. Wochenschr., Oct. 26, 1915.

(9) Missouri State Med. Ass'n. Jour., August, 1915.

times without injury. After observing the results from one or two doses of neosalvarsan, mercury was then begun and continued with subsequent injections of neosalvarsan when possible. The results show a rapid disappearance of cutaneous lesions, more rapid than with any other drug. One dose has usually been sufficient for this. The rhinitis and osseous lesions disappeared after two or three doses. In most of the cases the infant became as well in appearance as any infant similarly nourished. It is difficult to make a hospital syphilitic child gain on artificial food. Breast milk is almost a necessity. Three infants died, a mortality of 23 per cent. In the few instances in which repeated Wassermann tests were made, little effect was noticed on the subsequent reaction.

KHARSIVAN.

Therapeutic and Reaction Effects of Kharsivan. H. C. Lucey¹ makes an appeal to the medical profession to furnish it with accurate records of the results of the use of kharsivan, the British preparation of the same chemical constitution as salvarsan, and presents a definite scheme for recording such results. He has a record of 600 injections and believes this agent every bit as potent as the original German preparation. He calls attention particularly to a peculiar reaction which he attributes to an abnormal arsenical toxicity in a particular batch which occurred in 0.5 per cent. of the cases in which this particular batch of kharsivan was used. This reaction came on toward the end or a few minutes after an intravenous injection and consisted in slight edema of the lips and eyelids, a sense of fullness in the throat, and epigastric pain. In addition to this there might be rise in temperature, headache and diarrhea. He has had no such reactions with later batches, they having all proved satisfactory.

DIARSENOL.

Syncope Immediately After the Administration of Diarsenol. Sylvan H. Likes and Herbert Schoenrich²

(1) Brit. Med. Jour., April 29, 1916.

(2) New York Med. Jour., July 8, 1916.

state that they have had occasion during the last three months to administer numerous intravenous injections of a preparation made in Canada which the manufacturers claim is identical with the German salvarsan and to which they have given the name diarsenol. They find that the powder seems to dissolve less readily than salvarsan, requires a greater degree of heat for its solution, and gives off a rather strong, garlicky, disagreeable odor. The precipitate which forms after the addition of the alkali is darker, which is also at times the case with the solution when ready for administration. The therapeutic efficacy of the drug does not differ materially from that of salvarsan. On the whole the reaction did not seem to differ very materially from that of salvarsan, although it was observed in a greater percentage of cases, and when present came on earlier, was more severe in character, and in three cases it was alarming. In these cases, after the administration of 0.6 diarsenol, the patients went into profound syncope, with profuse sweating and extreme pallor; the wrist pulse was not palpable and in two of the cases there was nausea and vomiting. The writers are of the opinion that these reactions were due to some variation in the form of the drug.

Diarsenol Versus Salvarsan. More than 300 doses of the Canadian substitute³ for salvarsan—diarsenol—have been given by J. A. Gardner, who finds it to compare favorably in all respects with the original product. It seems to have a slightly greater tendency to rapid oxidation when dissolved, but this does not affect its toxicity. The technique of its administration and the doses are the same as salvarsan.

Treatment of Paresis by Intraventricular Injections of Diarsenolized Serum. P. C. Knapp⁴ says that a fairly large experience with the treatment of syphilitic affections of the central nervous system by intraspinal injection of salvarsanized serum by the Swift-Ellis method and its modifications has shown him that in no other way can he so constantly obtain good results. This opinion is reached from the study of about 500 injections on over a hundred patients. His experience,

(3) Jour. Amer. Med. Ass'n., April 22, 1916.

(4) Boston Med. and Surg. Jour., July 6, 1916.

like that of most observers, has led him to accept the hypothesis that the action of salvarsan and its substitutes, neosalvarsan and diarsenol, is most pronounced when it is exerted most directly upon the spirochetes. He has seen tabetics, who could stand only by the support of two nurses when treatment was first begun, who after a few injections would walk several miles with an approximately normal gait. He has seen patients completely paraplegic, with total loss of control over the bladder, leave the hospital walking normally, with complete control over the bladder, and with normal sensibility and reflexes, after three injections. Such brilliant results, however, he has not seen in cerebral cases. He considers the operative procedure fairly safe and feels encouraged to continue with this method.

LUARGOL.

Luargol or 102 in Syphilis. G. Milian⁵ refers to a compound of di-oxydiamino-arsenobenzol with bromine, silver, and antimony recently elaborated by Danysz. Experiments in the trypanosomiasis of rabbits showed that this compound will regularly effect a cure at a stage of the disease in which other arsenicals, including atoxyl, arsenophenylglycin, and arsenobenzol, frequently fail; in the last stage of the disease luargol will cure five out of six rabbits where the other compounds, in equal doses, have no effect whatever. The compound differs from arsenobenzol in that it gives better results when injected in small, repeated doses than in one large dose. It is supplied as an orange yellow powder, insoluble in water, but very soluble in caustic soda, with which it forms a dark brown solution. Luargol in the dose of 0.1 gram dissolves in 1.1 c.c. or better 1.5 c.c. of normal soda solution, and the injection is made with this solution diluted to 1 per cent. in sterile distilled water. As with salvarsan, the patient should fast before the injection and remain quiet for a few hours after it has been given.

In the treatment of syphilis Danysz counsels injections in progressive doses of 0.15, 0.2, 0.25, and 0.3 gram,

(5) Paris m6d., May 6, 1916.

up to a total of 1.2 or 1.5 gram; intervals of two, three, or four days should be allowed between injections. Febrile and general reactions following injections of luargol are much less marked than after salvarsan. A patient who could only withstand 0.45 gram doses of neosalvarsan, augmentation beyond this point being impracticable owing to the chills, headache, and vomiting which followed even these amounts, received increasing doses of luargol, up to 0.3 gram amounts, without febrile reaction or other disturbance.

Two cases of slight arsenical erythema have been observed after luargol but no "nitritoid" attacks. The drug has pronounced therapeutic activity, syphilis manifestations disappearing at times even more rapidly than after salvarsan or neosalvarsan. It has shown itself active in cases in which salvarsan failed to overcome ulcerative secondary lesions of syphilis. The new compound appears, therefore, to be an improvement over previous means of treatment in this disease.

GALYL.

An Experience of Galyl at Royal Naval Hospital, Chatham. S. F. Dudley⁶ relates his experience with galyl, which he has substituted for neosalvarsan in the treatment of syphilis, having given about 1,500 injections. Taking the results as a whole, he finds that neosalvarsan seems to have slightly more power in producing a negative Wassermann than galyl. Clinically, galyl seems to be almost as valuable as neosalvarsan, ordinary chancres and ulcerative lesions generally clearing up within ten days, but it must be confessed that a few patients a month or so after injection, still have the remains of a rash, and more rarely an unhealed sore, an event which in Dudley's experience was exceptional with neosalvarsan. Still galyl can exhibit the same dramatic cures as the older drug.

This fact points to arsenic as the important element in these drugs. The dose 0.4 gm. galyl contains just one-half as much arsenic as 0.9 gm. of neosalvarsan, which probably accounts for the slightly less therapeutic ef-

(6) *Lancet*, July 8, 1916.

fect and lesser toxicity of galyl. It would seem that though excellent results have been obtained with neosalvarsan and mercury with a month's interval between the intravenous injections, this interval is unnecessarily long in the case of galyl. As the dose recommended has only half the arsenic content of neosalvarsan, the interval might be halved without any more likelihood of the occurrence of cumulative arsenical poisoning, and if this were done galyl would probably be as good an agent for the cure of syphilis as neosalvarsan.

ATOPHAN.

Use of Atophan for Eliminating Uric Acid. Atophan and its compounds are derived from quinolin carboxylic acid. In six cases examined by Fine and Chace⁷ there was a general relationship between the degree of response of the administration of atophan on the one hand, and the extent of non-protein nitrogenous retention and the clinical pictures on the other. Their observations lend some support to the view that abnormal renal cells would be expected to prove less responsive to the action of atophan than healthy cells.

ATROPINE.

Atropine for Pylorospasm. Ochsenius⁸ remarks that the experiences in Czerny's pediatric clinic have demonstrated that children can bear much larger doses of atropine than was formerly supposed possible. This heralds a new era in treatment of pylorospasm, for doses of from one to three drops of a 0.01: 10.0 solution of atropine three or four times a day are proving effectual in curing pylorospasm. If it does not relieve, we may assume that there is congenital stenosis of the pylorus. Two cases are described in detail showing the prompt curative action of the atropine. He repeated the three-drop dose five or six times during the day, thus giving a total of 0.75 or 0.9 mg. of atropine. To avoid dilatation of the vessels in the skin, he gave one-drop doses,

(7) Arch. Int. Med., September, 1915.

(8) Deutsch. med. Wochenschr., Dec. 16, 1915.

before feeding increasing to three drops, and keeping this up for two or three weeks and then reducing it. The first child was a month old and was in collapse when the large doses of atropine were started, after failure of other measures during three weeks of treatment. The vomiting stopped at once and the weight increased by an average of 21 gm. a day for five weeks. The atropine was kept up intermittently for nearly ten weeks, and the child came out finally well and strong although gastritis had also to be contended with. The other child developed pylorospasm when three weeks old and by a mistake it was given eight feedings in the twenty-four hours with atropine each time. This brought the daily dose of atropine to eight times 0.15 mg., a total of 1.2 mg., which it bore for a week without the slightest harm. The maximal daily dose for an adult is said to be 3 mg. Both infants were breast-fed.

Mydriatic Activity of Atropine and Scopolamine. G. Joachimogin⁹ determined the relative activities of these allied drugs by local application to eyes of cats and found that scopolamine was ten times as active as atropine. He also found that the cat's eye was as sensitive as that of man. The dose of atropine required to produce distinct dilatation of the pupil was one drop of a 1 to 150,000 solution, or about 2/10,000 mg. of the sulphate. He also found that solutions of atropine sulphate without preservation retained their activity unimpaired for at least four weeks.

BALSAM OF PERU.

Treatment of Corneal Affections With Balsam of Peru. L. Muller¹ states that he has used balsam of Peru with success, for over four years, in the treatment of corneal ulcer and hypopyon. He uses it in the following combination:

R		gm. or c.c.
Balsami peruviani.....	gr. xv	1
Olei ricini	3ss	2
Olei olivae	3iiss-v	10-20
M. Sig.: Shake before using.		

(9) Berlin klin. Wochenschr., Aug. 30, 1915.
 (1) Semaine méd.

The eye is first carefully anesthetized with cocaine and epinephrine; the balsam preparation is then applied and left in contact with the corneal for about two minutes.

BENZOL.

Action of Benzol. Following the subcutaneous administration of equal parts of olive oil and benzol in rabbits, the authors of this article, H. G. Weiskotten, S. C. Schwartz, and H. S. Steensland,² found that there occurs a rapid decrease in the number of leukocytes in the peripheral circulation. Following this primary fall in the leukocyte curve there occurs a primary rise, which is, in each instance, followed by a secondary fall before a permanent rise to a normal level. The primary and secondary falls in the leukocyte curves are accompanied by a marked decrease in the percentage of polynuclear leukocytes, indicating that the polynuclear leukocytes are especially affected after the injection. Coincidentally with the primary fall in the leukocyte curve, there occurred, in two-thirds of the cases, a moderate but definite fall in the erythrocyte curve. The erythrocyte curve appears to progress independently of the leukocyte curve after primary fall, and in the majority of instances remains unaffected during the secondary fall in the leukocyte curve. This fall in the erythrocyte curve was usually followed by a rise. In rabbits in which the injections are begun two days and six months respectively after splenectomy, the leukocyte and erythrocyte curves are essentially the same as in the non-splenectomized rabbits which receive like injections, and the duration of the periods of regeneration is essentially the same. The differential counts on the non-splenectomized animals and those animals splenectomized two days and six months previously, show no essential differences, and the blood-cell picture is otherwise the same.

The authors are of the opinion that these observations on the leukocyte and erythrocyte curves indicate that in the rabbit the spleen serves no essential function in

(2) Jour. Med. Research, September, 1915.

the destruction of leukocytes and erythrocytes, following subcutaneous injections of the olive-oil-benzol mixture, or in their subsequent regeneration. Any destructive or regenerative function that it has is quickly assumed by some other part of the body when the spleen is removed. "Myeloid metaplasia" of the spleen is of no great importance as a compensatory phenomenon, and regeneration, as represented by the blood-count, takes place at least as quickly in the absence of the spleen.

Benzol in Leukemia. The principle of the treatment is considered sound by Boardman.⁸ He believes that with proper precautions, there is no appreciable danger in using benzol. The improvement is a real improvement and not due to accumulation of the leukocytes in the central vessels. The improvement is only temporary, as in other methods of treatment. The treatment is applicable in all chronic cases of leukemia. Bronchitis and anemia can not be considered contra-indications. The presence of nephritis is a more serious complication and demands more careful consideration. The treatment is more readily administered and is less costly than the Roentgen ray and may be given to those unable to obtain Roentgen ray. The percentage of improvements is about the same under benzol as under the *x*-ray.

The drug is best administered in freshly filled gelatine capsules with an equal amount of olive oil; the maximum daily dose not to exceed 5 gm. The treatment must be carefully controlled by frequent blood and urine examinations and discontinued if there is evidence of kidney irritation, or when the leukocytes reach 25,000 to 20,000. The best results follow the combined benzol and Roentgen-ray treatment, the benzol effect apparently being increased by a preliminary Roentgen-ray treatment. Some cases will not respond to benzol in the usual dosage and in the usual time, and other patients are unable to take the drug owing to gastro-intestinal disturbances, etc. When carefully administered and carefully controlled, benzol is apparently a valuable addition to the methods of treating chronic leukemia.

(8) Calif. State Jour. Med., September, 1915.

BROMIDES.

The Bromides in Epilepsy. W. Turner⁴ communicates his experiences with the use of bromides, summarizing them by saying that in 25 per cent. of the cases their administration caused a reduction in both severity and frequency of the fits and their ultimate arrest in many instances. The cases in which these results were secured were mainly mild and free from mental symptoms. In a second similar proportion of cases less marked, but still noticeable beneficial results were observed, while in the remaining 50 per cent. the drug had no influence. The last were the severe cases.

CALCIUM.

Calcium Chloride Prevents Night Sweats. This has been Peperhowe's⁵ experience. He experimented with sodium chloride and calcium chloride, and found the latter most effectual. Patients who used to be dripping with sweat at the morning visit were found dry and cheerful under the influence of the calcium chloride, and they now clamor for it. He explains its action by the theory that one element is the tranquilizing effect on the nervous system, as we know that the night sweats are the results of disturbance of vasomotor control from the influence of the products of the bacteria. Other elements in the benefit are the tonic and astringent properties of the calcium salts. Be this as it may, no injurious by-effects were noted in any instance, while it displayed an unmistakable tonic influence, justifying, he reiterates, its continued use.

Chlorinated Lime in Treatment of Wounds. W. Münch⁶ dissolves two tablespoonfuls of chlorinated lime in a dish of warm water and bathes all parts of the wound with it for twenty or thirty minutes twice a day; he then fills the wound with dry gauze. He supplements this local treatment with horsetail (scouring rush) tea internally, being convinced that the silicic acid in this

(4) *Brit. Med. Jour.*, Dec. 18, 1915.

(5) *Münch. med. Wochenschr.*, Nov. 6, 1915.

(6) *Münch. med. Wochenschr.*, June 29, 1915.

is an important aid in the healing of tissues. The decoction is taken like other tea, several times a day.

Lime in Treatment of Diabetes. In a number of experiments on diabetic patients, conducted by M. and M. H. Kahn⁷ they invariably found an increased calcium output, followed by a diminished amount of lime salt in the body. A similar increase of the calcium output has been noted in a variety of other complaints characterized by hyperglycemia. Acting on the theory thus suggested, they studied the effect on sugar excretion in diabetes when calcium salts were given with apparently satisfactory results. They report one case in a middle-aged woman who was excreting, on a standard diet, from 90 to 115 grams of sugar daily. When placed on the lime treatment, diet remaining the same, the glycosuria diminished materially in less than ten days. The glycemia ran a parallel course.

The Use of Calcium in Epilepsy. J. Bryant⁸ states that in addition to faulty heredity, malnutrition seems with considerable frequency to precede the onset of epilepsy. Many poverty rations, such as white bread and potatoes, are very deficient in calcium. The author tried the effect of calcium in the treatment of epilepsy with gratifying results. He does not present calcium as a panacea. It may not effect a cure in any case, but it at least can be said that when added to existing only partly successful treatment by bromides, calcium has in some cases produced results sufficiently encouraging to make it seem desirable to mention its employment and possible value.

Bryant desires to focus attention on a broader question related to calcium metabolism. It has been held that such manifestations, as for instance chorea, migraine, tic, tetany, and epilepsy, are absolutely unrelated disease entities. Proof is lacking. It is, on the other hand, not impossible that proof may be forthcoming to show that these diseases are, at least in some cases, merely different expressions of an underlying abnormality common to all. Three facts suggest that a lack of calcium may be a common underlying factor in more than one of these con-

(7) Med. Record, Oct. 30, 1915.

(8) Boston Med. and Surg. Jour., Oct. 7, 1915.

ditions: many diets are deficient in calcium, calcium is deficient in the brain tissue of those afflicted with certain explosive manifestations, and some of these diseases have been markedly relieved by the administration of calcium.

Effect of Calcium Chloride on Hemolysis. W. W. C. Topley and S. G. Platts⁹ state that their experiments afford no evidence of any protective influence exerted by calcium chloride on the red cells of animals subjected to the action of a specific hemolytic serum, though this salt serves to inhibit the lysis of the same cells by the same serum in test-tube experiments. Conclusions as to the therapeutic value of this and similar salts based on experiments *in vitro* must therefore be held to be invalid.

Intravenous Use of Calcium in Treatment of Tuberculosis. A preliminary report on this subject was published January 15, 1915, by Thomas J. Beasley who now makes a further report in the same journal.¹ A final report can not yet be made, he says, because much research work has not been completed, and the clinical data remain to be compiled. The purpose of the treatment is to saturate the blood with the normal amount of calcium, so it is imperative that the strictest individualization of the patients be made. Saturation is attained more quickly in a patient who weighs eighty pounds than in one who weighs 175, but by careful study of the coagulation time it is possible to regulate the dose so that both failure to saturate and over-saturation of the blood may be avoided. The bacteriologic findings recorded so far seem to indicate that this treatment has a distinct bactericidal effect on the tubercle bacilli.

CHENOPODIUM.

Influence of Oil of Chenopodium on Intestine. According to Salant and Mitchell,² oil of chenopodium in dilutions of 1:5,000 and 1:10,000 in Locke's solution produces in the isolated intestine of rabbits a marked decrease of tone which remains permanent and diminishes the frequency as well as the force of contractions, which

(9) Lancet, Jan. 16, 1915.

(1) Indianapolis Med. Jour., January, 1916.

(2) Amer. Jour. Physiol., November, 1915. An earlier article by Salant and Livingston is abstracted in Vol. VIII, 1915, p. 49.

disappeared altogether in from twenty to twenty-five minutes. Recovery occurred when the intestinal segments were placed in Locke's solution without oil of chenopodium. In carnivorous animals, oil of chenopodium usually, but not always, causes a preliminary rise of tone followed by a steady decline. Rhythmic contractions may increase in frequency, but disappear finally. Recovery may take place when the segments are put into Locke's solution. The reaction to oil of chenopodium was greater in the ileum than in the duodenum or jejunum, but was most marked in the colon. Caffeine has no antagonistic effect, but may, on the contrary, aid depression of tone caused by oil of chenopodium. Neither barium chloride nor pilocarpine has a true antagonistic effect, but may prevent to a small extent depression of tone when added before oil of chenopodium. Pilocarpine has no action on intestine which has been poisoned by oil of chenopodium, but barium produces an increase of tone. Nerve ends as well as muscle fiber are attacked by oil of chenopodium, but the latter is more resistant. Relatively large doses of oil of chenopodium are required to inhibit peristalsis in intact rabbits by intravenous injections. The presence of substances antagonistic to oil of chenopodium is offered as an explanation.

Chenopodium in Treatment of Uncinariasis. W. A. Bishop and O. T. Brosius³ refer to the investigations of Schneffner and Wervoort and Levy as to the value of chenopodium in comparison with other vermifuges in treatment of hookworm disease and state that they have had an ideal opportunity for carrying out further researches along these lines in the Santo Tomas Hospital, Panama City, where they have a large number of native West Indian negro patients, and where hookworm is an exceedingly common disease. In order to ascertain approximately the efficiency of chenopodium as a vermifuge in uncinariasis in comparison with thymol, it was decided that as good an indicator as any would be a comparison of the average number of hookworms expelled in the whole stool from equal numbers of unselected and previously untreated patients. The cases in which thymol was given and the first whole stool obtained were

(3) Jour. Amer. Med. Ass'n., Nov. 6, 1915.

sixty, and the average number of hookworms expelled was seventy-six. The first sixty cases treated with chenopodium gave an average of ninety-nine hookworms. Among more recent treatments there have been so much better results that the average of ninety-nine in the first sixty chenopodium cases has increased to 131 in ninety cases. In one instance there were expelled 1,379 uncinariae in the first whole stool.

In summarizing the authors state that the method of administration of chenopodium is simple, and is attended with less inconvenience and discomfort to the patient than thymol. This would give the drug an important place in field work in uncinariasis. Chenopodium can be given at shorter intervals than can thymol, and a cure can thereby be more quickly established, which gives it a greater economic value. Chenopodium is non-toxic in therapeutic doses they assert, and is a more efficient vermifuge than thymol in treatment of uncinariasis.

CHLORAL.

Chloral Hydrate in Cardiovascular Affections. A. Martinet⁴ points out that the warning against the use of chloral hydrate in cardiovascular disorders given in numerous text-books is unwarranted and has done harm in preventing the employment for hypotensor purposes of a drug both more efficacious and less injurious than the nitrites. Impressions concerning the action of chloral on the heart have been derived, he declares, chiefly from intravenous injection of toxic doses in animals. Actually, depression of the myocardium does not occur until enough has been given to depress dangerously the respiratory centers and the centers of nervous cardiac regulation. Daily doses of 28 grams of chloral in a number of instances have been given to tetanus patients without harm to the circulation. In dogs no increase of tolerance of the drug develops from its daily administration, even for long periods. The chronic toxic effects of chloral are exerted chiefly on the nerve centers, including especially the vasomotor centers, and to no special extent on the heart. Clinically, chloral is, with bromides, one

(4) *Presse méd.*, June 5, 1916.

of the best relievers of general and circulatory spasm. Many cases of angiospasm and high blood-pressure attacks, with or without sleeplessness, are effectually allayed. As advised by Brunton, chloralized patients, when marked vasodilatation and heat loss result, should be kept warm with flannel and hot water bags. Another most useful property is that of improving the urinary outflow where oliguria, combined with insomnia and high blood-pressure, seems due to excessive nervous excitability causing excessive renal vasoconstriction. In well-compensated high pressure patients with a urinary output of from one-fourth to one-third liter in from sixteen to eighteen hours, sleep induced by chloral hydrate is characteristically followed on awakening by an abundant diuresis, as much as a liter of urine being passed in six or eight hours, with manifest euphoria, relaxation from nervous tension, and lessened difficulty of breathing. The drop produced in the systolic blood-pressure, which may attain 30 or 40 mm., is coupled with a corresponding fall in the diastolic pressure, thus clearly betokening a peripheral as well as renal vasodilatation. When caffeine, used as a diuretic, has been given in doses so large as to cause constriction of the renal vessels and arrest the flow of urine (especially in excitable subjects), a small dose of chloral suffices to overcome the inhibiting angiospasm and produce diuresis. Chloral and caffeine make sometimes the combination of choice for diuretic purposes. While thus clearly indicated in conditions of neurocardiovascular erethism with insomnia, high blood-pressure, and oliguria, chloral is, on the other hand, contra-indicated in neurocardiovascular asthenia, low pressure, and somnolence, with or without reduced urinary output.

COCAINE.

Cocaine as a Respiratory Stimulant. From a rather extended experience, G. E. Pettey⁵ has come to regard cocaine as the most prompt and efficient of all respiratory stimulants. He usually gives $\frac{1}{2}$ grain hypodermatically, repeating the dose as required. Two illustrative

(5) Southern Med. Jour.

cases are cited. One was in a patient suffering from alcoholism with threatened respiratory failure, who had been in a semi-comatose condition for two days; the other was a case of paraldehyde poisoning.

COPPER.

Copper Sulphate in Treatment of Cancer. Manara⁶ gives a number of views of the microscopic findings in a case of cancer of the cervix in a woman of 49. They show the varying aspect of the pus and scrapings from the cancer during a course of copper sulphate treatment, with final cure and no signs of recurrence during the months that have elapsed since. The woman had refused operation and treatment was merely a daily intramuscular injection in the buttocks of 1 per cent. solution of ammoniacal copper sulphate in distilled water. He relates that the glycogen in the neoplasm transforms the copper sulphate reaching it into copper oxide. Under the caustic action of this copper oxide the cancer tissues swell and break down into an amorphous mass. This arrests the growth of the cancer which thus becomes transformed into an afebrile, mild inflammatory process which gradually heals. The course of these changes can be traced in the microscopic findings reproduced in the typical cases reported, all of which confirms his previous announcements on the subject. Cancer elsewhere than in the uterus is less protected against injury from without or from digestive juices, etc., so as to date he advises the copper sulphate treatment only for uterine cancers.

CRESATIN.

Cresatin in Gonorrheal Ophthalmia. Barnert⁷ says that he has found in cresatin (meta-cresyl acetate, the acetic acid ester of meta-cresol) a synthetic phenol derivative, a specific in gonorrheal ophthalmia. One application of the pure cresatin on a cotton swab to the cocainized cornea and conjunctiva usually gives marked and rapid relief of symptoms and disappearance of the

(6) Policlinico, Surg. Sect., October, 1915.

(7) Med. Record, Feb. 5, 1916.

gonococci. A second application is sometimes necessary, but a third rarely so. A 25 per cent. solution in liquid petrolatum is an efficient prophylactic. This treatment limits the duration of the ophthalmia to twenty-four or forty-eight hours after the first application. The drug, he declares, is absolutely non-injurious to the tissue cells of the cornea or conjunctiva.

DIGITALIS.

Clinical Study of Various Digitalis Drugs. The discussion of the relative value of the various drugs making up this group is started by Halsey⁸ by the statement that, from the standpoint of the clinician, they differ from each other mainly in the rate and certainty with which they are absorbed and excreted and in their local action before absorption. Clinically there appear to be no qualitative differences of practical significance in their all important actions on the circulation. And all who have sufficiently investigated their clinical effects have reached the conclusion that once it has been absorbed in sufficient amounts, digitalis produces all the desirable effects which may be produced by any of the others. Further, it has been established that, contrary to very generally held views, digitalis is absorbed more rapidly and certainly and is less irritant to the stomach than any of its congeners. Many of the older text-books (and some of the newer ones) state that, as strophanthus is absorbed more rapidly and is less irritant to the stomach, it is to be preferred to digitalis where prompt action is desirable or where the digestion is disturbed. The real facts, Halsey says, are directly opposed to this. There is but one way to give strophanthus and that is intravenously, using, if it be obtainable, either the crystalline strophanthin or ouabain in dosage not to exceed one-half of a milligram ($1/20$ of a grain), reserving such use of it for cases urgently needing a "digitalis" effect, and never giving it, except in still smaller amounts, to patients who have been taking digitalis or any of this group in the recent past. This dose may be repeated, if needed, in from eighteen to twenty-four hours. Its effects are

(8) Southern Med. Jour., August, 1916.

usually apparent in from fifteen to thirty minutes and persist for twenty-four hours. Used in properly chosen cases and in proper doses, the prompt and useful effects of this drug are among the most gratifying. In regard to the clinical value of apocynum and squill Halsey states positively that he has never seen either of these drugs do good in any case in which digitalis had failed after a fair trial. They have no advantages under any clinical conditions over a good preparation of digitalis.

Halsey prefers the tincture of digitalis. For various widely advertised proprietary digitalis preparations Halsey claims that a number of extravagant and false or misleading claims are made. Among the commonest of these is the claim that the preparation in question is free from cumulative action. Any preparation of digitalis free from cumulative action is also without therapeutic value. In digipuratum the digitalis active principles are present in a form in which they are insoluble in the stomach. Consequently they do not irritate the gastric mucosa although after absorption they, like all digitalis bodies, stimulate the emetic center and consequently can and do cause vomiting. Digipuratum is, however, a preparation of very uniform strength, and were it not for its high cost Halsey says he would never use any other for oral administration. Digitalin, as commonly used, is the so-called digitalin germanicum, which is a mixture of varied composition and of uncertain strength. Different samples vary in strength so that some are more than twice as powerful as others. One-sixtieth of a grain of this preparation is equal in therapeutic activity to from 3 to 5 minims of an average tincture of digitalis.

Stability of the Infusion of Digitalis. R. A. Hatcher and C. Eggleston⁹ conclude that the infusion of digitalis is fairly stable when prepared and kept with ordinary care, no important change then occurring within a week. The addition of alcohol to the infusion is unnecessary. Old, and even moldy, digitalis and its infusion may give the typical digitalis actions qualitatively so long as they retain any considerable degree of activity. A properly made infusion of digitalis represents the leaf practically

(9) Jour. Amer. Med. Ass'n., Nov. 27, 1915.

in its entirety, the action being qualitatively like that of the tincture. Owing to the variability in activity of the infusion as it is commonly obtained, the tincture should be preferred to it in therapeutic practice.

Electrocardiographic Studies of Patients Under Digitalis Treatment. The following summary is given by H. W. Stevens:¹ The cases in which digitalis produces marked slowing of the heart are those of abnormally rapid rate; the drug in ordinary doses appears to have little or no effect upon rates which are normal. The ventricular slowing may be produced in cases of normal auriculo-ventricular sequence and in cases of auricular fibrillation and auricular flutter. In some cases of normal rhythm under digitalis treatment there is a distinct increase in the P-R interval, and an accompanying increase in the R-T interval. In some cases of fibrillation also the increase in the R-T interval is found. In most instances these increases are coincident with a decrease in the rate, and hence accompany an increase in the length of the whole heart cycle. A possible factor in the improvement of the heart's action under digitalis may be the increased mechanical advantages resulting from the increase in the total length of the cardiac systole. Transformation in both P and T waves appear coincidentally with and apparently related to the digitalis treatment. These variations are not constant. A single case in which digitalis coupling occurred shows, in all instances of the extra systoles, complexes of the same type, indicating a common focus of origin. A single patient showed a much increased susceptibility to slowing by vagus pressure during the digitalis treatment.

Effect of Digitalis on Human Electrocardiogram. White and Sattler² gave digitalis by the mouth to five normal young male adults in amounts ranging from 2.0 to 3.0 gm. of standardized leaves in the course of from seven to ten days. The As-Vs interval was prolonged in four or five subjects, the greatest prolongation occurring in the case of the subject who received the most digitalis and none at all in one who received only 2.0

(1) Boston Med. and Surg. Jour., March 9, 1915.

(2) Jour. Exp. Med., May, 1916.

gm. There was no prolongation to so great an interval as 0.2 second until 2.7 gm. had been taken. The effects of the digitalis on conduction time began when from 1.5 to 1.8 gm. had been taken. The effects persisted for from one to two weeks after the drug had been stopped. Atropine removed completely the effect of digitalis on A-V condition. The slowing heart-rate after exercise was accompanied by an enhancement of the defect in conduction. The change in conduction through digitalis was therefore almost entirely, if not entirely, due to increase of vagal tone and irritability.

Digitalis did not affect to an appreciable extent the Q-end of S and the Q-end of T intervals. Exercise and atropine both shortened the ventricular complex Q-end of T while the subject was under digitalis. The amplitude of the T wave was changed within forty-eight hours after digitalis had been started, a decrease then beginning which became greater as the drug was continued and which persisted until from ten to nineteen days after the digitalis had been stopped. The change in the T deflection preceded by several days the change in conduction time. The T wave, therefore, in the normal subject as well as in the patient gives us the earliest indication of digitalis action. The amplitudes of P, Q, R and S were not materially influenced by the amounts of digitalis given. The pulse-rate in two subjects became lower than usual at night as the result of the digitalis; otherwise there was no evidence of vagal action on the sino-auricular node. Blood-pressure was uninfluenced by the digitalis. Mild subjective sensations occurred in all the subjects during the administration of the drug. A curious, hitherto undescribed, digitalis arrhythmia consisting of blocked auricular premature beats occurred in one subject after 3.0 gm. of digitalis had been taken.

Digitalis and Blood-Pressure. Discussing the relation of digitalis to blood-pressure, Burdick³ says that the present tendency is to agree with Mackenzie, who holds that digitalis does not greatly influence blood-pressure one way or the other. Yet many of our first authorities, such as Sollmann, Cushny, and Hare, state unequivocally

(3) Med. Council, February, 1916.

that digitalis raises blood-pressure. Dr. Burdick observes that practically every clinician of extended experience does not recommend digitalis in high blood-pressure cases, until there are marked evidences of decompensation or dilatation of the heart; and, when this condition presents we are not treating high blood-pressure *per se*, but a weak heart.

After citing other authorities in the same line, he concludes that it is wise to wait for further developments before taking a positive and final stand on the effect of digitalis on blood-pressure. Meanwhile, in his opinion, the latest experimental contributions to the subject seem to indicate that digitalis is not the pressor drug that it has been thought to be for some generations back.

Action of Digitalis on Peripheral Blood-Vessels. Golovinsky⁴ studied the action of digitalis on the peripheral vessels of dogs, rabbits and frogs. He used digipuratum in various concentrations (1:5,000 and 1:1,000) which he passed in Ringer's or Locke fluid through the isolated ears (Kraykoff's method) or through the splanchnic and the portal systems (Frohlich's method). He found that solutions of digipuratum in doses that may have a therapeutic effect do not affect the lumen of the peripheral vessels of the regions examined—skin, splanchnic or portal system—while toxic doses caused dilatation. The increased blood-pressure from digitalis is thus due to the increased cardiac activity.

Action of Digitalis as Tested by Cardio-Inhibitory Center. Greene and Peeler⁵ found that digitalis strongly and directly stimulates the cardio-inhibitory center of the medulla. Paralysis of the center by excessive action is shown by the escape of the heart during perfusion and by the failure of subsequent perfusions to produce inhibition. Cumulative and persistent action on the inhibitory nerve center is indicated by the recurrence of various degrees of inhibition during subsequent perfusion with Ringer's solution. Not only is the rhythm inhibited, but there is a blocking of the passage of the contraction wave from the veins and sinus to the ventricle by a decrease in conductivity.

(4) *Russkiy Vrach*, 1915, XIV, No. 30.

(5) *Jour. Pharm. and Exp. Therap.*, December, 1915.

Influence of Digitalis in Cases of Auricular Fibrillation. In three cases with auricular fibrillation, reported by G. N. Stewart and R. W. Scott,⁶ the blood flow in the hands was promptly and decidedly increased after the administration of digitalis. In a fourth case, which had not been considered to respond well to digitalis, the hand flow was somewhat increased when the drug was stopped after a rather long course of it. Digitalis having been again begun, the hand flow at the end of a week was again found to be diminished.

Digitalis and Physostigmine as Hypotensor Remedies. D. Danielopolu,⁷ at a recent meeting of the Biological Society of Bucharest, stated that prolonged observations in thirty-two cases had convinced him that digitalis never raised, but often lowered, the blood-pressure. Its hypotensor action seems to be more marked if a suitable dose of physostigmine has previously been administered.

EMETINE.

Rational Emetine Therapy. R. L. Levy and L. G. Rowntree⁸ point out, as a result of clinical observations and numerous experiments in animals, that the administration of emetine hydrochloride is not to be regarded as a harmless procedure, ill effects sometimes following its use, even in therapeutic doses. A man suffering from amebic dysentery and lues received 29 grains of emetine subcutaneously in a period of twenty days. After slight amelioration this treatment was followed by violent diarrhea, abdominal pain, increasing albuminuria, acute renal insufficiency, acidosis, broncho-pneumonia, vasomotor collapse, and death. A woman with pyorrhea alveolaris, who received four $\frac{1}{2}$ grain injections on successive days, acquired a distressing diarrhea lasting six days, with pain in the back and abdomen and tenesmus, these symptoms then gradually subsiding.

The experiments and clinical notes of the authors show that the toxicity of the various commercial preparations of emetine varies widely, and likewise that patients

(6) Jour. Pharm. and Exp. Therap., October, 1916.

(7) Presse méd., June 5, 1916.

(8) Archiv. Int. Med., March, 1916.

differ markedly in their susceptibility to the drug. Individualization in emetine treatment is therefore essential. The drug should preferably be given subcutaneously and in courses at intervals of several days or a week. In amebic infections Levy and Rowntree consider $\frac{1}{3}$ grain three times a day for a week or ten days usually a safe dose. It is rarely necessary to administer more than $1\frac{1}{2}$ grains daily.

According to Bass and Johns, $\frac{1}{2}$ grain of emetine daily for from three to six days is all that is required in pyorrhea. It should be borne in mind that over a long period of time even relatively small doses of emetine may prove harmful. Intravenous injections of emetine should be given only in extreme cases. Small doses, well diluted e. g., $\frac{1}{2}$ grain in 100 c.c. of salt solution, should alone be used. The injection should be made slowly, and the blood-pressure meantime be carefully observed, the experiments of the authors having shown that a sudden, pronounced drop in pressure is readily induced by this drug when given intravenously. The oral route of administering emetine is impracticable, even small doses causing marked irritation.

Microbicidal Action of Emetine in Vitro. According to Kolmer and Smith⁹ emetine hydrochloride possesses bactericidal properties, but prolonged contact with bacteria is required before this action becomes apparent. A 5 per cent. solution of emetine failed to kill *B. typhosus* in fifteen minutes, but with a special technique, in which the drug remains in contact with the test microorganisms, emetine proved about equal to or even on occasion five times more antiseptic and germicidal than corresponding dilutions of pure phenol. The bactericidal activity of emetine is more apparent in fluid than it is in solid culture media. In an emulsion of pus and various bacteria from pyorrhea alveolaris a 2 per cent. solution of emetine required forty-five minutes to effect sterilization, whereas a corresponding dilution of phenol proved germicidal in five minutes or less; a 0.5 per cent. solution of emetine required one and a half hours, and a corresponding dilution of phenol, forty-five minutes, to sterilize the emulsion. Emetine is highly amebacidal.

(9) Jour. Infect. Dis., March, 1916.

The logical treatment of pyorrhea alveolaris should consist primarily in its local application combined with hypodermatic administration, especially in severe infection or in those accompanied by systemic complications.

Chronic Poisoning by Emetine. In a preliminary note, H. H. Dale¹ cites clinical observations of instances in which the long-continued use of emetine in doses which were individually harmless apparently led to the development of toxic symptoms. The symptoms observed included diarrhea and general toxic manifestations, and suggested the possibility of cumulation. Experiments made on cats and rabbits showed that the repeated administration of subtoxic doses invariably led to cumulation with the development of diarrhea, lethargy, somnolence, and even coma. Post-mortem examination of these animals showed intestinal irritation and damage to the kidneys and liver. These animal observations together with the clinical experiences led to the warning not to indulge in the indiscriminate use of emetine beyond the limits, already established as the results of expert observation.

Emetine Hydrochloride in Amebic Abscess of the Liver. After a successful trial, F. Paraiso² recommends in amebic abscess of the liver, the hypodermatic administration of emetine hydrochloride, in the deltoid or gluteal region in doses up to 0.08 gram in twenty-four hours repeated daily until symptoms are relieved.

Balantidiosis Treated With Emetine. Haberfeld³ reports the case of a patient who had suffered for four months from diarrhea, the number of stools averaging about twelve daily and containing pus and at times blood. No fever was present and the internal examination showed the organs to be normal. Examinations of the stool revealed the presence of *Balantidium coli*. Emetine was injected subcutaneously in the dose of 0.03 gram, and during the next twenty-four hours the patient had but one stool compared to eight the previous day. The injection was repeated daily and the effect was the same. There was but one stool daily and the nature of

(1) Brit. Med. Jour., Dec. 18, 1915.

(2) Ann. Paulistas de Med. e Cirug., November, 1915.

(3) Münch. med. Wochenschr., Feb. 2, 1915.

the stool had changed. The consistence of the stool increased so that it was no longer fluid and the pus disappeared. After the third injection no balantidia could be found. After 0.25 gram emetine had been injected the patient was discharged and remained cured. The only unpleasant accompaniment of the treatment was the fact that at every injection site a small itching eczematous patch appeared, which, however, responded very readily to treatment with salves.

Emetine in Cholera. The remarkable effects of emetine in amebic dysentery and its occasional value in sprue-like forms of diarrhea, together with its favorable action in hemoptysis and hemorrhage from the gastrointestinal tract, led Leonard Rogers⁴ to consider whether it might not be of service in checking the rapid loss of fluid in cholera. He accordingly tried it in a small series of cases with an equal number of controls, and concludes that emetine has no influence over the disease for good or bad when the hypertonic saline treatment is also employed.

Emetine in Dermatitis Herpetiformis. On the belief that this condition is usually of an infectious toxic nature and since it is often associated with pyorrhea alveolaris, M. F. Engman and Robert Davis⁵ tried the effects of the administration of emetine. Four cases are reported in which the condition was greatly improved. It is not implied that the drug had any specific action on the dermatitis, or that it is suitable for the treatment of the condition in general. It is merely suggested that it may be of assistance in those cases in which pyorrhea is the probable source of the toxic substances.

Emetine in Dysenteric Arthritis. The occurrence of arthritis in connection with amebic dysentery is not uncommon, but there is no complete proof that the condition is of amebic origin. T. G. Moorhead⁶ has had experience of several cases of this condition and in each the arthritis has yielded promptly to the systemic administration of emetine.

(4) Indian Med. Gaz., January, 1915.

(5) Jour. Amer. Med. Ass'n., Feb. 12, 1916.

(6) Brit. Med. Jour., April 1, 1916.

Emetine Hydrochloride in Treatment of Purpura Hemorrhagica. The most striking feature in the case cited by Cole and Querens⁸ was the bleeding from the gingival margins of the superior incisor and bicuspid teeth. The ecchymotic area extended almost to the frenum of the mucous membrane, and the gums were bleeding freely; on having the patient hold his head in position so the blood could drop into a basin the rate was 40 drops a minute. The gums on both margins showed an advanced pyorrheal condition. On the right edge of the tongue near the tip there was a small ecchymotic spot the size of a pea. The throat was negative. As a local application to the gums, glycerite of tannin was tried; no improvement resulted in twenty-four hours, so the drug was discontinued. A 1:1,000 solution of epinephrine chloride was substituted, which seemed to alleviate the condition slightly. Calcium lactate in the powdered form, 15 grains every four hours, proved valueless.

The following day one-half grain of emetine hydrochloride was administered intramuscularly, and almost immediately a hematoma about the size of a small peach formed at the site of puncture in the right arm. Eight hours afterward a similar condition occurred on the left arm, following a second administration. The next day, on repeating the emetine, the results were the same. The patient's condition failed to improve and the ecchymotic areas increased in number and size; the calcium also had been continued. Intravenous administration of the emetine was begun and $\frac{1}{2}$ grain was given directly from the ampule, undiluted, into the median basilic vein; only a small ecchymotic spot formed at the site of puncture. Six hours afterward, the injection was repeated, and on the following day improvement was noticed in the gum condition, and the failure of any more spots to appear. The drug, same dosage, was repeated twice daily, alternating from right to left arm for each injection. The hemorrhagic areas began to undergo the various colors associated with blood degeneration and no new spots appeared; the patient's general condition began to improve and he claimed that he felt better. The emetine

(8) New Orleans Med. and Surg. Jour., January, 1916.

was continued until ten doses were given, when it was discontinued altogether, owing to the absolute disappearance of all symptoms.

Emetine in Pyorrhea Alveolaris. Gosline⁹ employed emetine in the treatment of forty-two cases grouped as spongy gums, very spongy gums, and spongy gums with loose teeth. The treatment was the so-called full treatment and the local treatment. The full treatment consisted in the administration of emetine hydrochloride, 1/6 grain, twice a day subcutaneously, and the application of the wine of ipecac to the gums twice a day for one week, followed by a second week's treatment in which the gums were swabbed with wine of ipecac and an injection of emetine hydrochloride, 1/3 grain, was administered once a day. Of fourteen patients with spongy gums, eleven showed marked improvement, two moderate improvement, and one slight improvement. Of the twelve with very spongy gums, those treated locally showed only moderate or slight improvement, while those treated with emetine in addition to the local treatment showed 87.5 per cent. marked improvement. The group with loose teeth and spongy gums showed 78.6 per cent. marked improvement, but in no case with loose teeth did the teeth become firmly set once more.

ETHER.

The Antiseptic Action of Ether in Peritoneal Infections. According to John Saliba's¹ writings he has used ether for over a year as a routine in all cases of peritoneal infection that came under his care at the Elizabeth City Hospital, N. C. He makes an instillation of one ounce of ether into the peritoneal cavity for a child about four years of age and three ounces for an adult, and employs proctoclysis and Fowler's position in the after-treatment. In all the cases in which this treatment was used there were untoward after-effects that could be attributed to an overdose of ether in only two instances

(9) Boston Med. and Surg. Jour., July 22, 1915.

(1) Jour. Amer. Med. Ass'n., April 22, 1916.

out of a series of 248 cases, and these cases were of an exceedingly grave nature at the time of operation. The writer reports five cases of appendicitis in which he employed this measure.

Ether-Saline Infusion in Tetanus. Hercher² describes a single case of recovery from tetanus in which this remedy was tested, but the incubation period was fourteen days, and the most that can be claimed is that the disease responded favorably to the treatment. The original wound, in the arm, was suspicious. The disease began insidiously as rheumatism but the picture of tetanus was soon in evidence. Treatment was intensive—serum, magnesium, and morphine. The patient, however, seemed doomed so that a new remedy was sought and found in the before-mentioned infusion. Fifteen cubic centimeters of ether were added to 750 cm. of saline infusion, and the case at once took a turn for the better, the treatment being continued until recovery.

FUSCHSIN.

Fuschsin in Treatment of Pyodermatitis. Ferreira³ has seen benefit from local application of fuschsin in a number of cases of impetigo, intertrigo and other obstinate skin affections in infants. He cites the details of twelve cases.

He uses the ordinary bacteriologic fuschsin stain, Ziehl's carbol-fuschsin solution, which he prepares by dissolving 1 part fuschsin in 10 parts alcohol, with 5 parts phenol and 100 parts distilled water. He has used this in hundreds of cases and never has seen any signs of absorption of phenol, the urine never showing any change in color or composition. With this technique there is no need for a dressing. The fuschsin mixture is applied on cotton to the crusts, and pressed into each after all loose and friable parts of the crusts have been removed with sponges dipped in a 1:1,200 solution of zinc sulphate or its equivalent. The crusts absorb the fuschsin mixture and harden, forming an impermeable red varnish. The preparation is applied fresh each day

(2) Münch. med. Wochenschr., Aug. 17, 1915.

(3) Archiv. de méd. des enfants, August, 1915.

and the crusts gradually grow smaller. The only drawback is the possible staining of the linen.

GREEN DYE.

Brilliant Green as an Antiseptic. Experiences cited by Archibald Leitch,⁴ and those of others, tend to show that this triphenyl-methane dye is from five to ten times as actively bactericidal as mercury bichloride. Since, however, these experiments were done *in vitro*, the efficacy of the substance, when used in the presence of the serum in the tissues of wounds, had to be determined by clinical experience; the result was that the drug proved to be of great value. It was used in a solution in the proportion of 1 to 1,000, the solvent being distilled water, or normal or hypertonic salt solution as desired. Wounds were first cleaned with dry gauze, and an ounce or so of the solution was introduced into the wound, which was then packed with gauze saturated with the solution. The dressings were changed daily or oftener in badly infected cases for a few days. The first effect observed was the total disappearance of foul odor. The dead tissues were found to have taken up the dye, while the living ones remained unstained, giving a clear differentiation, so that dead tissues could readily be removed. After a few days, fresh, healthy granulations sprang up and healing proceeded rapidly in most cases. The dye seemed to have a much greater avidity for bacteria and dead tissues than other elements in the wounds. It also proved destructive to anaërobic organisms. In a few cases it was followed by the usual favorable effects for a few days, after which the granulations became pale and unhealthy. Then change to iodine water or other dressing brought about prompt healing. In some cases brilliant green failed altogether of good effect, but such cases resisted all other measures. The disadvantages of the drug were its staining properties for clothing and the hands, although the stain could readily be removed by alcohol or even water. It did not produce toxic effects and seemed to act as a decided stimulant to granulation tissue.

(4) Brit. Med. Jour., Feb. 12, 1916.

GOLD.

Use of Colloidal Gold in Surgery. R. Belbeze⁵ reports his experiences with this agent in extensive infected wounds and severe, prolonged suppurative conditions. No untoward results were encountered in 316 intramuscular and thirty-two intravenous injections of the remedy. By the first method from $\frac{1}{2}$ to 1 dram (2 to 4 c.c.) was injected daily; the intravenous dose used was from 4 to 16 minims (0.25 to 1 c.c.). The intravenous injection is followed in from twenty to thirty minutes by a chill; this gives way after a like period to a sensation of warmth, sometimes with sweating, the temperature meanwhile dropping from 1.5 to 2 degrees centigrade. This drop is not permanent, and a series of three or more injections is advised, according to the case under treatment. Intramuscular injections produce similar, though less prompt and marked effects. Concurrently with the fall in temperature the patient's general condition improves. In febrile suppurative cases in a condition of shock early intravenous injection of colloidal gold gives especially striking results. Favorable local effects are also produced, suppuration being modified and subdued, and tissue repair greatly activated. The author recommends the use of this agent in all serious general or local infections, including extensive suppurating wounds.

Colloid Gold as an Adjuvant in Treatment of Typhoid Conditions. Barachon⁶ reports good results from the use of colloid gold in the form of collobiase, an electrochemically made preparation. Intramuscular injections gave very inconstant results, most marked in mild cases and during defervescence, but entirely insufficient in grave cases. Intravenously, the remedy was generally given in ascending doses ranging from 0.1 to 2 c.c. None of the patients received even the cold pack as a substitute for cold baths—the latter being impracticable in the existing circumstances. Each injection was observed to cause typically, at the expiration of fifteen minutes, a severe chill, followed by a rise in temperature to as high as 42° C., sometimes accompanied by slight

(5) Bull. d' acad. de méd., Jan. 19, 1915.

(6) Paris méd., June 17, 1916.

transient delirium and a general sensation of heat. This was soon followed by a copious sweat, and the latter, in turn, by marked general improvements. The pre-existing headache disappeared, the mucous membranes often regaining their normal moisture, the mind was clarified, prostration passed off, and the patient felt improved and sank into a quiet sleep. The temperature fell and temporarily remained low. The general condition was, however, especially benefited. When the temperature is not sufficiently lowered or the improvement less than expected, Barachon gives a second injection on the next day; if results are good, the injections are repeated only at two day intervals. The cases in which there is no improvement are those of profound and long-standing infection, and such lack of effect is of unfavorable prognostic significance.

Like all colloid solutions, colloid gold has bactericidal and antitoxic properties. The constitutional effects seem, however, to show that it acts especially by exciting the defensive processes of the organism. The drug is said to cause a sudden doubling in the number of polynuclear neutrophiles in the blood and thus an intense phagocytosis, the latter being favored by a corresponding and equally rapid rise in the opsonic index. The sweat produced does not take place at the expense of the urinary output, an increase in the renal elimination of water being nearly always observed. Each injection is followed, as it were, by a period of truce with the disease, all toxic symptoms disappearing, and although the course of the disease is, perhaps, not shortened by the treatment, the patient is enabled to pass through the ordeal under favorable conditions. Though useful even at the height of the disease, the injections should, if possible, be begun at the outset, while the defensive resources of the body are still unimpaired. They should be repeated as often as fever and particularly the general condition seem to require them. They are contra-indicated only in threatened perforation or hemorrhage and in myocarditis. In cases of sudden defervescence and profuse sweating in weak subjects the heart should, for the sake of caution, be temporarily sustained with one or two injections of camphorated oil.

HYPOCHLOROUS ACID PREPARATIONS.*

Behavior of Hypochlorites on Intravenous Injection.

H. D. Dakin¹ observes that eusol has been recommended for intravenous injection in man. Granting that the maximum possible concentration of the hypochlorous acid contained in the full dose persisted for a short period of time, there would only be from 50 to 65 mg. of the acid present per liter of blood. This is far below that concentration which shows any active direct action on such organisms as the colon bacillus or staphylococci suspended in blood or serum *in vitro*. The action of the hypochlorites depends upon the active chlorine liberated and experiments, both *in vitro* and *in vivo*, have shown that the chlorine at once becomes anchored in an inert form to one or more constituents of the blood and that a very large quantity of hypochlorous acid has to be introduced to give the faintest detectable trace of active chlorine. Further, the idea of some secondary effect, such as the stimulation of antibacterial or antitoxic substances, is not supported by experimental results. Lastly the drugs of this group are not without harmful effects and even in small amounts produce hemolysis of the red cells in the living animal. The only conclusion which may be drawn from the experiments is that these substances, when injected intravenously in the doses advised, can not have any appreciable direct germicidal action.

The Therapeutic Value of Hypochlorous Acid. Raul Flores Cordova² publishes the results of experiments made during the past nine months to determine the antitoxic and antiseptic power of hypochlorous acid *in vivo*. He presents tables showing the efficacy of 10 c.c. doses of the hypochlorous acid solution in certain artificially produced infections and toxemias. These show that in rabbits 10 c.c. intravenous doses of 0.5 per cent. solution of the acid, even when repeated two or three days in succession, produce no ill effects, that they may delay or prevent the onset of symptoms due to the injection of the

(1) Brit. Med. Jour., June 17, 1916.

(2) Brit. Med. Jour., May 6, 1916.

*Other abstracts on this subject appear in Vol. II, 1916, pp. 53-56.

animals with diphtheria and tetanus toxins and with cultures of *Bacillus perfringens* and *Staphylococcus pyogenes aureus*, the rabbits recovering from the infection or remaining healthy. He concludes that hypochlorous acid intravenously administered is to be regarded as of therapeutic value; the antiseptic apparently delays the development of the bacteria and destroys their toxins. It is suggested that the destruction of the toxins is in the nature of a protein coagulation.

IODINE AND THE IODIDES.

Constitutional Iodism. The phenomena liable to develop after administration of iodine internally are discussed by A. Oswald³ who says that the Zurich region seems to be the headquarters for disturbances of this type. They were first systematically described in Rilliet's classic work with the above title, published in 1860. The syndrome he described occurs mostly in persons over 40. Besides this, there is a syndrome which resembles exophthalmic goiter in every respect; it develops in the young, and in those who have never had any previous symptoms of exophthalmic goiter, and it usually subsides after suspension of the iodine treatment. The entire literature on the subject has been studied by Oswald and he relates considerable personal experiences. Everything seems to indicate that the iodine stimulates the thyroid, and possibly other glands, with an internal secretion, to extra functioning. The result is thus the same as in primary exophthalmic goiter, which is now ascribed to extra functioning of the thyroid. Both syndromes are the result of an excess of thyroid secretion being poured into the circulation; theoretically, therefore, iodine can induce the true Basedow syndrome. A predisposition is necessary for both, but it is not necessary to assume for either that the thyroid is producing an abnormal secretion; given an abnormally sensitive nervous system, an excessive amount of a normal secretion is enough to explain all the symptoms observed. With iodine hyperthyroidism the nervous system is suf-

(3) Rev. médicale de la Suisse Romande, Geneva, September, 1915.

fering from the iodine, and it recuperates when the iodine is withdrawn. With true exophthalmic goiter, the nervous system is suffering from the chronic oversupply of thyroid secretion and the nervous factor is thus both a predisposing and the provocative element in the clinical syndrome. Recuperation is consequently more difficult.

Iodine in Goiter. According to Grumme⁴ endemic goiter is due to a lack of iodine in the food, and hence administration of iodine benefits endemic goiter. He thinks that if Switzerland would promote the importation of sea fish, so that they would be plentiful and cheap, goiter possibly would be less prevalent. More than two thousand years ago the Greeks recommended sponge charcoal (*Schwammkohle*) for goiter, which was an iodine treatment, and experience has confirmed the value of iodine in prevention and cure of endemic goiter. Regions where goiter is endemic are usually free from the exophthalmic form, in which iodine does harm. Even the eating of sea fish aggravates Basedow's disease as Grumme has confirmed in his own practice. It is important, therefore, to exclude any tendency to the Basedow type before permitting iodine therapy. A tranquil temperament and a phlegmatic disposition usually exclude exophthalmic goiter. The endemic mountain-goiter is generally inclined to be hard and sometimes knobby, while the Basedow goiter is soft. Grumme warns in conclusion that the administration of iodine requires great care not only for those with goiter but in general practice as there may be a latent predisposition to Basedow's disease which iodine may fan into a flame. Oswald regards this danger as so serious that he advises against iodine for any form of goiter.

Iodine Poisoning. Merlet⁵ points out that attempts at suicide by means of the tincture of iodine are becoming more and more frequent. There seems to be great variation in the dose taken by different individuals, death having followed the ingestion of 6 gm. of the tincture, while 10 gm. have been taken without ill effects, and 60 gm. merely followed by an obstinate gastro-enteritis. A variety of antidotes have been advocated, but none com-

(4) Corr.-Bl. f. Schweiz. Aerzte, April 15, 1916.

(5) Jour. de méd. et de chir., 1915, No. 8.

pares in efficacy with sodium hypochlorite. It may be given, as a 10 per cent. solution, in almost any dose with no untoward action except that of a purgative. More than an ounce need not, however, be given, and this amount is without ill effects. A great advantage of the drug is that it may be obtained almost anywhere, in an emergency, owing to its general use in photography. It is also by far the best reagent for removing iodine stains from the skin.

Anal Fissure Cured by Tincture of Iodine. Patients suffering from anal fissure are now usually operated on, but Maschat⁶ declares that this is unnecessary and that these patients can be cured by the application of a very simple remedy, namely tincture of iodine. Maschat has employed this method for fifteen years with uniform success. With the help of an assistant, he exposes the fissure, cleans it with cotton dipped in boiled water, and then paints it thoroughly with tincture of iodine, and that is all. This treatment is repeated three or four times at three or four day intervals. From the first day, pain is reduced, and after the third cauterization the cure is complete and permanent. The pain, while severe, especially at the first application, lasts only a few minutes, and is always easily borne; so well, in fact, that only very rarely is it found necessary to make cocaine applications.

Iodine in Tetanus. Experiments on guinea-pigs have forced MacConkey and Zilva⁷ to come to the conclusion that iodine injected subcutaneously has no effect on tetanus toxin which has been also injected subcutaneously in a different place. One can not, therefore, hope to influence favorably the course of an attack of tetanus by injections of iodine alone, nor does iodine appear to have any effect in enhancing the power of serum. It would seem, they say, that iodine can only be of use when applied to the infected focus, so that it can come into direct contact with the toxin before absorption.

Iodine in Operating on the Eyes. Alcoholic tincture of iodine, 5 per cent., was used by Orechkin⁸ with satis-

(6) Prov. méd.

(7) Brit. Med. Jour., March 18, 1916.

(8) Russkiy Vrach, XV., No. 7.

factory results in numerous ophthalmologic operations. The patient's lids, portion of forehead, corresponding side of the nose, cheek and temporal region were painted with the 5 per cent. tincture. Moist regions and the eye secretions are dried previous to the application of the iodine solution. The latter must be always freshly prepared. The burning sensation caused by the iodine may be quite severe, in spite of preliminary cocainization, but disappears in a few minutes. After the painting with iodine, the conjunctival sac, in operations on the eyeball, is flushed copiously with a sterile 1:5,000 solution of cyanide of mercury.

None of 237 cataract operations gave suppuration, while with other antiseptic methods he had suppuration in 2 per cent. with subsequent loss of the eye. In 1,200 other operations on the lids and adjacent portions only in five cases was there suppuration in the sutures, and he explains this complication by the low grade of intelligence of the majority of his patients. He comes to the conclusion that Grossich's method of disinfection of the operative field is the best and that it should be given preference also in ophthalmic surgery.

Iodine in Treatment of Major Infections. According to Boudreau,⁹ iodine is the most easily managed of internal disinfectants, the least harmful with the maximum of action, and the one to be preferred to all others unless there are formal contra-indications. It seems, he says, to modify the "organic habits" while rousing and stimulating the natural activities which have been slumbering, sluggish or perverted. Wherever there is infection he regards iodine as indicated—the fact that it is found naturally in the body gives him confidence in its use.

Iodine does not accumulate in the body but is rapidly eliminated, and hence the doses must be fractioned as much as possible and adequate amounts given. Years of experience with it, he states, have confirmed him in the belief that it is microbicide and antitoxic, and has a stimulating action on production of leukocytes and on functioning of glands—especially the ductless glands—besides a general tonic action on the vital functions. In septicemia of any kind it tends to break up what he

(9) Jour. de méd. de Bordeaux, January, 1916.

calls "the bowel-blood vicious circle" and, given in time, especially in typhoid, seems to ward off the development of this vicious circle. He asserts that iodine has no preference among bacilli. He gives it whenever fever develops, without waiting to differentiate the special cause. He discusses in particular typhoid, puerperal fever, epidemic meningitis, measles, scarlet fever, and whooping cough, saying that the intensive iodine treatment not only aids in throwing off the infection and reducing the contagiousness of the disease, but seems to ward off complications. It does not conflict with but supplements vaccine and antitoxin treatment. He insists on the necessity for giving iodine by the rapid-firing, small dose method, day and night in acute infections. In whooping cough he gives 7-year-old children an average of 60 drops of the official tincture of iodine of the French Codex, distributed throughout the twenty-four hours.

[This tincture differs from the U. S. P. tincture; the French Pharmacopeia directs simply the solution of iodine in 90 per cent. alcohol; 1 part of iodine for every 12 parts of alcohol.—Ed.]

He states that children of 3 can take 40 or 50 drops without apparent harm. The results are excellent, shortening the course of the disease and warding off complications, especially when supplemented by local sterilization of the throat, rubbing the chest with balsam oil, and giving hot iodized baths.

His main contention, however, is that iodine should be given in tuberculosis and pushed to the extreme limit of tolerance. For some time he has been proclaiming that iodine must be regarded as the direct and heroic treatment for tuberculosis, and his continued experience has apparently confirmed this. He reiterates, however, that it is absolutely indispensable to begin with minute doses and work up slowly and gradually to the large dosage. Boudreau's article was in press at the time the war broke out, and he adds to it that the war experiences of the last sixteen months with infectious diseases and infected wounds have merely re-enforced all his statements.

Iodine in Peritonitis. Dr. J. A. Crisler,¹ of Memphis, from his large experience in the use of this drug and the

(1) Southern Surg. and Gynec. Ass'n., Dec. 13-15, 1915.

clinical manifestations after its use in these cases, has been led firmly and conscientiously to believe, that the infected fluids free in the cavity, are at once sterilized, and that the absorption of toxins, which after all is the real mortuary factor in peritonitis, is immediately terminated for at least twenty-four hours. Also an outpouring of serum and new phagocytes is encouraged. He has been strengthened in this belief by the fact that a high temperature in these cases in a few hours almost invariably falls to normal or nearly so. Furthermore, there is an abundant serous drainage, more plentiful than the drainage common in other methods. This tends to disgorge and in a measure to wash out the subserous cellular tissues, which may receive the beneficent antiseptic effect through a process of osmosis directly from the iodine that comes in contact with the inflamed serosa.

In his investigations of the elimination of the iodine element, he has found that it has never appeared in the urine earlier than the eighteenth hour after its use in the abdomen, and then only in very small quantities. The height of elimination is attained about the seventy-second hour. He conjectures that the absorption of toxins is held in abeyance for a like period. All the facts brought out by these studies, clinical, physiologic, and chemical combine to show the truth of this assertion. During this period there is developed in the patient an auto-resistance and toleration quite sufficient to overcome the disease. From Dec. 1, 1914, to Dec. 1, 1915, he operated in 678 abdominal cases with twenty-three deaths. In this number of operations he had 104 pus cases. In other words, slightly over 15 per cent. of all of his abdominal cases were due to pus in the abdomen, either localized and walled off, or free with no effort at walling off. In this latter series he had one death, the patient reaching him in a moribund and utterly hopeless condition.

Intravenous Iodide Treatment of Tropical Bubo. Da Matta² applied the usual measures in vogue in treatment of fourteen patients with tropical bubo, but the tedious course of treatment required, and the lack of benefit in some cases, caused him to look for something better.

(2) Brazil-Med., Nov. 13, 1915.

A trial of intravenous injections of sodium iodide gave good results which he describes in detail. One patient was given three injections of 10, 15 or 20 gm. of sodium iodide, and was completely cured in a week of bilateral tropical inguinal bubo with intense pains and fever for two days before the treatment was started. Da Matta declares that the sodium iodide has antiseptic and antitoxic action; it is a tonic and restorative, an energetic sedative, and a therapeutic drain, accelerating the elimination of noxious elements as is shown by the rapid resolution of the acute or chronic inflammation of the glands. He ascribes the method to Klemperer. He declares that it seems to be true specific medication for tropical bubo.

Iodine Internally in Place of Potassium Iodide. Zaussailoff³ recommends tincture of iodine as a substitute for potassium iodide in diseases such as syphilis, rheumatism, gout and obesity. The dose is one drop given three times a day, and is daily increased by one drop to a dose. In many cases fifty drops were given three times a day without any of the by-effects which are so common with potassium iodide, and without any gastro-intestinal irritation. He used it in 352 cases, and gives detailed reports of twenty-four cases.

Antiseptic Properties of Iodized Oil. According to V. Golovin⁴ iodine in oil is a useful antiseptic and antipruritic application in wounds, boils, eczema and ulcers. He employs either olive or cottonseed oil to which a few drops of the tincture of iodine are added, the amount of iodine depending on the strength desired. The oil is heated in an open vessel and the iodine added drop by drop, the mixture being stirred after each addition with a glass rod. It is put into a stoppered bottle. When freshly prepared, the oil has the color of iodine, but loses the color on standing. It is the decolorized oil that should be used.

Iodide of Potassium in Syphilis. Iodide of potassium is particularly valuable in tertiary lesions writes D. W. Montgomery,⁵ whereas mercury and salvarsan are effective in all stages of the disease. All three may be used in the same case. The iodide is not altogether valueless

(3) *Russkiy Vrach.*, 1915. No. 33.

(4) *Russkiy Vrach.*, Feb. 20, 1916.

(5) *Med. Record*, Nov. 13, 1915.

in the early stages, having a beneficial influence on prodromal symptoms such as fever, headache and pains in the limbs. The three principal effects of the iodide are a prompt diminution in the bulk of the syphilitic tumor, possible lowering of blood-pressure and a beneficial action on blood-vessel walls. Iodides have no effect on the chancre, the adenopathy, the eruptions of early syphilis, or on some later eruptions, neither have they the power to change the Wassermann reaction. Sodium iodide is less active than the potassium salt, although less disagreeable in taste. Iodoform in liquid paraffin has been used, but not with great success. Iodopin is a 10 or 25 per cent. chemical combination of iodine with the unsaturated fatty acids of the oil of sesame and can be introduced subcutaneously.

IODOFORM.

Emulsion of Iodoform in Treatment of Bloody Stools.

Moszkowski⁶ has used with success a method of treatment which has long done valuable service in amebic dysentery in the Dutch East Indies in the hands of de Haan and K. de Jonge. An emulsion of 80 gm. iodoform with 100 gm. gum acacia in 180 c.c. distilled water is given by rectal injection. A soft tube is introduced into the intestine for 50 cm. Then 45 or 55 c.c. of the emulsion are forced into the tube with a syringe. His thirteen patients bore the injection well and retained the fluid for two or three hours. In one case one such enema was sufficient; in 3 two enemas were required; in 2, three enemas; in 3, four; in 3, five and in one very severe case nine of the injections were given. They not only arrested the tendency to hemorrhage but cured the diarrhea, and the tenesmus subsided almost invariably after a single injection. No dysentery bacilli were found in his cases but paratyphoid bacilli were found in one. The spleen was enlarged in three cases. Benefit was apparent in each case, so that Moszkowski advocates giving these injections daily in all cases of bloody diarrhea regardless of whether dysentery, typhoid or other cause is responsible for the disturbance.

(6) Berlin. klin. Wochenschr., Jan. 31, 1916.

ICHTHYOL.

Septic Wounds Treated With Ichthyol and Glycerine.

The advantages Duggan⁷ claims for ichthyol are: There is practically no irritation of the wound; the dressing does not adhere to the surface of the wound, it need only be changed once in twenty-four hours, in extensive septic wounds, not more than twice in twenty-four hours; there is a great saving in cottonwool, lint, and bandages; the strain in nursing is lessened; the patient is no longer disturbed by frequent dressing, and the time in the hospital is considerably curtailed, as compared with other methods.

The method of application to the wound is by means of a camel-hair brush. Paint the surrounding skin, as well as the whole surface of the wound, or apply it on lint or gauze. On changing the dressing, avoid washing the surface of the wound with lotion; dry the surface with a small swab or cottonwool, and occasionally dab the surface with pure spiritus vini rectificati, for the drier the wound is kept the quicker the healing process. The dressing may adhere to the edges of the wound; to detach it, use freshly boiled water instead of any of the ordinary antiseptics.

MAGNESIUM.

MAGNESIUM CHLORIDE.

Therapeutic Effects of Magnesium Chloride. Cases are reported by Rosenblith⁸ in which suppuration was apparently inhibited by external use of a 1.2 per cent. solution of magnesium chloride. In the case of a soldier wounded in the right sacrolumbar region by shrapnel, with paraplegia and extensive ulceration, hydrogen dioxide or Labarraque's solution failed to arrest the extension of this ulceration, but magnesium chloride dressings brought about rapid improvement of the wound, in spite of the markedly poor condition and emaciation of the patient. In a fracture of both bones of the forearm in which a deep sinus still persisted ten weeks after the

(7) Practitioner, January, 1916.

(8) Bull. de l'acad. de méd., Sept. 28, 1915.

injury, the institution of magnesium chloride dressings brought about complete healing in twelve days. In two cases of gonococcus rheumatism both the joint symptoms and the urethral discharge practically ceased when subcutaneous injections of magnesium chloride solution were given. In a patient suffering from acute gonorrhea for four days, the inflammatory or bacteriemic stage came to an end in less than forty-eight hours when three injections, each of 2 c.c. of magnesium chloride solution were given. Such injections may also be expected to produce improvement in septicemic states. Thus, in a wounded man whose evening temperature had held at 40° C. for three months, a drop of from 1 to 1.5° C. took place after the third of a series of magnesium chloride injections, and the lower temperature level was maintained until complete recovery. Accelerated tissue repair, owing to inhibition of suppuration through augmented phagocytosis, proved a prominent feature of the action of magnesium chloride solution in wound dressings.

Magnesium Chloride Solution in Infected Wounds.

A. Pinard⁹ describes the results obtained in a military hospital by the use of magnesium chloride solution, originally recommended by Delbet and Karajanapoulo, in infected wounds. A solution containing 12.1 grams of the anhydrous salt in 1,000 grams of water had been found greatly to increase the phagocytic power of the leucocytes, both *in vitro* and *in vivo*. In the present series of over 100 cases, all infected, and including a number of amputations and compound fractures, the more readily obtainable crystalline magnesium chloride was used in a solution containing 18 grams of the salt in 1,000 grams of sterile water. All antiseptic solutions were discarded. The wounds were irrigated with the magnesium chloride solution, then covered with a thin layer of sterile absorbent cotton impregnated with the same solution. Wounds with copious suppuration or presenting recesses in muscular or bony tissues were dressed twice daily in the first five days, then once daily. All drains were removed, and small counter-openings made only when the pus was discharged with difficulty. The results were

(9) Bull. de l'acad. de méd., Nov. 23, 1915.

strikingly good. Suppuration very quickly diminished in the next few days and epidermic growth from the margins of the wounds was unusually rapid. No cauterization of fleshy granulations was ever required. Suppuration in bones yielded with like rapidity, provided that all cavities were irrigated. The temperature always returned to normal when proper irrigations were begun. In a case of inflamed thigh stump, two subcutaneous injections each of 80 c.c. of the solution, at the margins of the reddened segment of limb brought rapid relief. In a case of wound of the knee-joint with multiple patellar fracture, free fetid suppuration, and a temperature of 104° F., thorough daily irrigation of the joint and all its synovial recesses with the magnesium chloride solution until the latter returned clear was substituted for the otherwise necessary arthrotomy. In nine days suppuration ceased. On the whole, the results were far superior to those secured by the ordinary antiseptics. The magnesium chloride solution is neither irritant nor toxic.

MAGNESIUM HYPOCHLORITE.

Advantages of Magnesium Hypochlorite. Mayer¹ says that magnesium hypochlorite is less caustic than sodium hypochlorite, while it is a powerful disinfectant and is very cheap. He prepares it by dissolving 190 gm. of magnesium sulphate in 2 liters of water and mixes this with 2 liters of water into which 100 gm. of chlorinated lime have been stirred. The precipitate of sulphate is then allowed to settle completely and the clear fluid is decanted ready for use. This fluid is tolerated perfectly by the tissues, he says, so it can be used freely. The organism bears magnesium well, quite differently from free sodium or lime.

MAGNESIUM SULPHATE.

Injections of Magnesium Sulphate in Chorea. Five successive patients with chorea were treated by Heiman² with repeated subcutaneous injections of magnesium sul-

(1) *Paris méd.*, Feb. 19, 1916.

(2) *Amer. Jour. Dis. Child.*, August, 1916.

phate. In every case a 25 per cent. sterile solution was used. The dose ranged from 0.01 gm. magnesium sulphate per kilogram of body weight (that is, 0.04 c.c. of the 25 per cent. solution) at the beginning of treatment, with a daily increase to 0.2 gm. magnesium sulphate per kilogram of body weight (that is, 0.8 c.c. of the 25 per cent. solution) at the termination of treatment. The actual amounts of solution used daily were from 3 to 30 c.c. The injections were given three times daily for from ten to fifteen days, with the ordinary record syringe, into the back loins and buttocks of the patients. In only one of the five patients treated by this method was there a marked improvement after the series of injections, and in this case the choreic movements gradually diminished, the child became less irritable and general improvement was noted. In the four other cases there was no improvement, the magnesium sulphate having had apparently no effect whatever on the psychomotor system. The results of the treatment in this series of cases was not sufficiently promising, in Heiman's opinion, to justify a continuation of the treatment.

Magnesium Sulphate in Delirium Tremens. Edward A. Leonard³ states that lumbar puncture should be performed and from 10 to 40 c.c. of spinal fluid withdrawn. Following this 1 c.c. of a 25 per cent. solution of magnesium sulphate should be injected for each twenty-five pounds of body weight. The withdrawal and injection should be made with the patient in the sitting posture and then he should be lowered to one of semi-recumbency. Nearly constant attention is required for twenty-four hours after the injection to secure nourishment and proper care of the bladder and rectum. The treatment produces prompt relaxation and often a paraplegic state which begins to disappear in from twelve to twenty-four hours. Complete restoration of function and reflexes usually occurred in from thirty-six to forty-eight hours, and the patients were then permanently free from their delirium and restlessness. Twelve patients were treated thus, only one injection being required in any case. Ten recovered and two died, a great improvement over the results of the usual methods of treatment.

(3) Jour. Amer. Med. Ass'n., Aug. 12, 1916.

Magnesium Sulphate in Non-Amebic Dysentery. F. Wyatt-Smith⁴ directs attention to an account of his experience with magnesium sulphate in this form of dysentery during a campaign in India. His experience has been confirmed by reports from the front in the present European War, as well as from the South African War. While this treatment was known three hundred years ago, this fact, he declares, need not discourage our young men of today, for they will be gratified with the results from this treatment in non-amebic dysentery.

MENTHOL.

Menthol in Tuberculous Sinuses. C. Bennett⁵ calls attention to the good results obtainable in surgical tuberculous conditions by prolonged exclusive use of menthol, which he holds superior to iodoform, iodine solutions, bismuth salts, and other substances hitherto used in these cases. As a substitute for iodoform, menthol is of value in avoiding odor, skin rashes, and doubtful antiseptic properties of the former, and likewise the necessity of submitting it before use to dry sterilization. Bennett now uses menthol alone in surgical tuberculosis, particularly in the post-operative treatment of conditions where surgical eradication of infected tissue can not be complete. The solution of menthol found most generally serviceable was as follows:

R
 Mentholis gr. xl
 Alcoholis ʒi
 Fac solutionem.

Sterile white gauze ribbon was soaked in the solution and, the excess of fluid having been pressed out, was ready for immediate use as packing. Such a dressing Bennett finds, need not be changed for three days. Comparative trials with gauze soaked in alcohol alone left no doubt as to the efficacy of the menthol. The granulations of the sinuses remained of a healthy type, discharge was rapidly reduced to a minimum, and healing

(4) Brit. Med. Jour., Nov. 27, 1915.

(5) Glasgow Medical Journal, February, 1916.

noticeably accelerated. An added benefit was local anesthetic action, preventing post-operative pain. The skin remained healthy around the sinus margin throughout the treatment, and no undesirable effects from absorption of the menthol were noticed at any time. From the successful action of menthol in tuberculous sinuses with secondary infection, a like beneficial effect in chronic, non-tuberculous, septic conditions is inferred.

MERCURY.

MERCURIC CHLORIDE.

Intraspinal Injections of Bichloride of Mercury. At a recent meeting of the Section on Medicine of the New York Academy of Medicine Edward Livingston Hunt⁶ reported forty cases of spinal syphilis treated by the intraspinal administration of mercurialized serum, and five cases treated by the direct intraspinal injection of bichloride of mercury. Since that time he has treated twelve additional cases by direct administration of bichloride of mercury into the spinal fluid. These twelve cases consisted of cases of general paresis, tabes, taboparesis, hemiplegia, optic nerve atrophy, and one case of brain syphilis with complicating hemiplegia. They were given either 1/64 or 1/50 of a grain of bichloride of mercury at each intraspinal injection. The injections were approximately at intervals of two weeks. The patients were at the same time being given mixed anti-syphilitic treatment. In a few of these patients it was not possible to obtain definite results, but in the large majority improvement was manifest. Hunt concludes that the administration of bichloride of mercury directly into the spinal fluid gives practically the same results as the administration of mercurialized serum. It has the advantage over the latter of simpler technique, shorter method, and easier administration, with less opportunity of infection. Both the administration of mercurialized serum and bichloride of mercury injected directly into the spinal fluid can be considered as valuable substitutes for administration of salvarsan. Whether re-

(6) Boston Med. and Surg. Jour., June 1, 1916.

sults will be as permanent as those of the latter remains to be seen. In no instance was any change manifest in the reflexes, but change was evident in the tremors, in the pains, in the spinal fluid content, and especially in the general condition of the patient.

Intradural Medication with Mercuric Chloride for General Paralysis. Ireland and Stuart Wilson,⁷ in the State of Washington, where the high cost of salvarsan and its scarcity in the market of the Western United States have prevented them from general use of the Swift and Ellis method, have adopted the Byrnes method, because of its apparent freedom from danger and low cost. From one of the veins of the forearm 40 c.c. of blood are taken and the serum allowed to separate. To 12 c.c. of clear serum is added 1 c.c. of a sterile solution of mercuric chloride containing $1/50$ grain and 17 c.c. of sterile normal salt solution prepared from freshly distilled water. This total of 30 c.c. is heated to 56° C. in a water-bath for thirty minutes. Lumbar puncture is performed, and from 15 to 30 c.c. of fluid are withdrawn, and the 30 c.c. of diluted mercurialized serum is slowly injected. A 25 c.c. Luer syringe was employed for the purpose.

The authors publish abstract notes of twenty-three patients under their care. The treatment has proved safe. Autogenous serum is found to be preferable to pooled serum. The reactions are found a little more severe than those which follow the Swift and Ellis 40 per cent. salvarsan serum treatment. Seventy-five per cent. of the authors' patients showed a clinical improvement after four or five treatments, but a tendency to relapse to the former condition was noted in about 40 per cent. of those at first improved. The clinical is more marked and more rapid than the serologic improvement. The authors desire that it should be known that the after-histories of their cases are too short for them to report on permanent improvement, and that therefore they will publish a later report of the same series. The colloidal gold test is most resistant to change; it is possible to have clinical general paralysis with a negative Wassermann reaction in blood serum and spinal fluid, but in this series the colloidal gold test was uniformly positive.

(7) *Archiv. Int. Med.*, Feb., 1915.

Intravenous Administration of Mercury in Syphilis. Thad Shaw⁸ reports sixteen cases in which this method was used for administration of mercuric chloride. The dose used was from 1/8 to 1/6 grain to a patient of from 140 to 150 pounds body weight every five to seven days. The results were speedy and gratifying, and Shaw commends the method as exact, safe and rapid. A low grade of phlebitis is produced which is in proportion to the concentration of the solution.

MERCURY CYANIDE.

Intravenous Administration of Mercury. The *Gaceta Medica de Nicaragua*⁹ recommends the intravenous injection of mercury cyanide in doses of from 0.0025 to 1 cgm. daily in lesions which are either frankly luetic or merely suspiciously so. Such conditions are iritis, iridocyclitis, keratitis, chorioretinitis, glaucoma, obscure hepatic conditions, aneurysms, periostitis, and obstinate rheumatism. These mercurial injections have frequently succeeded, it is said, in cases in which salvarsan and neosalvarsan had failed.

MERCURY SALICYLATE.

Mercury Salicylate in Syphilis. Working with military prisoners under conditions of perfect control, and relying on Wassermann tests performed by the same man throughout, Kent Nelson¹ found that the objective symptoms of syphilis would yield slowly to this drug, but that the Wassermann reaction could never be rendered lastingly negative. He expresses the belief that the treatment, unaided, does not possess real curative value.

MERCURY SUCCINIMIDE.

Treatment of Pyorrhea by Deep Injections of Mercury. Barton Lisle Wright² advises the administration

- (8) Med. Record, May 6, 1916.
- (9) December, 1915.
- (1) Jour. Amer. Med. Ass'n., Nov. 27, 1915.
- (2) Med. Record, May 8, 1916. A previous article on this subject by the same author is abstracted in Vol. III, 1916, pp. 311-312.

of 1 grain of mercuric succinimide every seventh day by the deep intramuscular method in men and from $\frac{3}{4}$ to $\frac{4}{5}$ of a grain in women until pus has disappeared and the gums have regained their normal appearance. Local treatment embraces expression of pus from the pockets, removal of tartar, extraction of hopeless teeth and roots, and polishing of the tooth structure. To this may be added application to the gum margin of a mixture of equal parts of tincture of iodine, tincture of acornite and chloroform every second day. The longest time required to effect a cure was forty-one days, the shortest four days, with an average of seventeen days. The greatest number of injections required to cure the primary infection was seven, with an average of 2.9.

MISTLETOE.

Mistletoe (*Viscum Album*) as a Diuretic. Bonnamour and Naz³ report having witnessed the energetic diuretic action of a maceration of fresh mistletoe, both in man and rabbits. The only active variety of the plant proved to be that growing parasitically on the hawthorn; mistletoe obtained from other plants exerted little or no action. In rabbits subcutaneous or intravenous injection of a fresh decoction caused an outflow of urine to the extent of 0.5 liter, and a 350 per cent. increase in the elimination of urea, persisting for several days. Clinically the drug proved most efficient in cases of chronic nephritis with edema or uremic manifestations and in arteriosclerosis. During its administration the urinary output showed a rapid increase, often amounting to double that previously procured by a milk diet. Simultaneously, the urinary chlorides increased, and the urea elimination attained the normal or even exceeded it, on the second or third day of treatment. The blood-pressure dropped—in one case from 230 to 150 mm. Hg. (Pachon instrument)—the body weight diminished, edema disappeared, and general improvement was noticed. Pleural effusion or ascites, when present, often disappeared with the edema, but the best results were obtained with the drug where tapping or venesection had previously been carried out. Albumi-

(3) Lyon m6d.

nuria was generally reduced—to a certain minimal limit—during the period of increased urinary output. Whenever the drug was discontinued the excretion of urine, with its several constituents, diminished. On the whole, the remedy seemed to the authors to deserve a place equivalent to that of squill as a diuretic. The mode of administration they employed consisted in macerating from 1 to $1\frac{1}{3}$ ounce (30 to 40 grams) of the fresh drug in one quart (liter) of white wine. The resulting preparations, given in doses of $4\frac{1}{2}$ ounces (130 grams) a day, was almost invariably well borne where other preparations of mistletoe had not been readily tolerated. Stress is laid on the use of a fresh preparation, experiments having shown that after a few days the diuretic property of the drug is impaired and the depressant effect on the blood-pressure is replaced by one of circulatory stimulation and bulbo-spinal excitation.

MORPHINE.

Action of Morphine on the Heart. Hering⁴ discusses the experimentally demonstrated fact that morphine in large doses, by increasing vagus tonicity, may indirectly induce a heterotopic impulse for the heart action, that is, induce ventricle automatism. The effect of the morphine varies as the heart is sound or diseased, the pathologic heart responding more readily. Hence extra caution is necessary when giving morphine to patients with a tendency to abnormally located impulse production. The sudden onset of fibrillation is a reasonable explanation in many cases of an immediately fatal attack of angina pectoris, and morphine, by promoting the tendency to fibrillation, that is, to heterotopic impulse, production, may prove a factor in the fatal outcome. At the same time, he warns that the valuable aid from morphine in angina pectoris should not be discarded, but only that the dosage should be supervised with special care. He remarks parenthetically that the action of drugs on animals has been studied too exclusively on healthy animals. Diseased organs respond more readily to smaller doses.

(4) Deutsche med. Wochenschr., Sept. 23, 1915.

NITROUS OXIDE.

Nitrous-Oxide-Oxygen in Obstetrics. Nitrous oxide is the safest and best agent for producing analgesia or anesthesia in labor. W. H. Long⁵ says that it has no cumulative action, is under the complete control of the administrator at all times, has no untoward effect on the lung, heart or kidney, and is immediately eliminated on withdrawal. The depth of its action can be readily controlled, and any degree from slight analgesia to a true anesthesia can be quickly produced at will, and analgesia may be maintained indefinitely; it does not merge into a deep anesthesia unless the diluent, and pure oxygen has preference over the air, is diminished, thereby concentrating the nitrous oxide. If version, forceps, or any operative procedure becomes necessary the analgesia may be merged into anesthesia, which ordinarily may be continued indefinitely. There is no danger to the child if the gas is in the hands of one expert in its use. This, Long says, is the consensus of opinion on this question.

Irving⁶ regards the mixture of nitrous oxide and oxygen as being the most successful analgesic known for the relief of the pains of labor. It has no untoward effects, immediate or remote, on either mother or baby. It does not delay labor or in way impair the efficacy of the uterine contractions. It is pleasant to take, and recovery from it is extremely rapid and usually featureless. It can be administered anywhere and it can be employed by any physician who will take his confinement cases seriously enough to retain a capable assistant for its administration.

Nitrous Oxide Anesthesia. A. R. Warner⁷ describes his experience with nitrous oxide gas used for anesthesia during the past eight years, and the method which he has devised for its manufacture in a sufficiently pure state to be without poisonous effects. The advantages of this anesthetic when the gases are used are that it is not disagreeable or irritating, consciousness is lost promptly, vomiting is extremely rare, pneumonia and post-operative shock are much less frequent and the pa-

(5) Kentucky Med. Jour., January, 1916.

(6) Boston Med. and Surg. Jour., March 30, 1916.

(7) Jour. Amer. Med. Ass'n., Dec. 4, 1915.

tients are able to leave the ward sooner than with other anesthetics. The lesser degree of muscular relaxation with nitrous oxide anesthesia which is sometimes annoying to the surgeon may be overcome by mixing a little ether vapor when the relaxation is needed.

NOVOCAINE.

Pharmacology of Novocaine. According to Hatcher and Eggleston⁸ the toxicity of novocaine is greatest when a concentrated solution is injected rapidly into the vein, in which case a dose of 40 mgm. per kilo is fatal to the cat and rabbit, and probably to other animals, though much smaller doses cause severe and even threatening symptoms. Very much larger doses may be injected slowly into the vein or subcutaneously without causing more than temporary disturbances. The subcutaneous injection of a mixture of novocaine and epinephrine results in greatly delayed absorption and consequently diminished toxicity of the novocaine for the cat. When such mixture is injected intravenously there is a synergistic constrictor action on the vessels, with an antagonistic effect on toxicity probably due to the action of epinephrine on the heart. The toxicity of novocaine is increased, but in a variable degree, by the previous administration of hydrated chloral which depresses the respiratory center. The extremes of toxicity of novocaine shown when it is injected rapidly into the vein of a chloralized cat (10 mgm. per kilogram, fatal) and when administered slowly to a normal cat (408 mgm. per kilogram with only temporary disturbance), suggest a possible explanation of the accidents occasionally seen when small doses of novocaine are used clinically. Novocaine leaves the bloodstream rapidly, being fixed or destroyed in the liver, the weight of evidence pointing to its destruction in that organ. Less than 3 per cent. (if any) of a large intravenous dose is excreted unchanged in the urine of a cat within a period of two or three hours.

Irritation of the Kidneys from Novocaine. Morian⁹ declares that irritation of the kidneys is by no means un-

(8) Jour. Pharm. and Exp. Therap., July, 1916.

(9) Zentralb. f. Chirurg., July 3, 1915.

common after application of novocaine for local anesthesia. In from 5 to 10 per cent. of the cases in which he has used it, albumin became evident in the urine within a few hours after injection of the novocaine, and it could be detected afterward up to a maximum of forty-eight hours. The amounts ranged from merely traces to 0.5 per thousand. Formed elements were also present in the urine. The output of urine did not seem to be materially modified by the irritation of the kidneys, but sometimes it was irregular and sometimes scanty. Half and quarter of an hour before the injection of novocaine adult patients received 0.01 gm. morphine. The albuminuria did not seem to be dependent on the amount of novocaine used, or the site of the injections. Almost every one of the patients operated on under local anesthesia suffered from vomiting later; it usually came on a few hours after the operation. Morian adds that neither morphine nor epinephrine induce albuminuria, so that only the novocaine can be incriminated, although albuminuria as a by-effect of novocaine has not been recorded hitherto, to his knowledge. He repeatedly tested the blood-pressure during the novocaine anesthesia, and found that it was not affected by the novocaine. Hence the albuminuria can not be ascribed to fluctuation of the blood-pressure. Schwartz reported in 1907 that he had observed albuminuria up to 7 per thousand after stovaine anesthesia.

Novocaine and Adrenaline. Bechtol¹ says that the preparation of novocaine and adrenaline for local anesthesia is simple. For minor operations, or when working in a home, sterile tablets of from $\frac{1}{3}$ to 1 grain are employed and are ready so soon as dissolved in sterile water. In hospital practice for an ordinary hernia or laparotomy, from 2 to 3 ounces of a 0.5 per cent. solution, to which is added from 6 to 10 drops of a 1 to 1,000 adrenaline solution, is prepared by first boiling the crystals of novocaine and later adding adrenaline. A fresh solution is made for each operation. The maximum dose of novocaine is variously given as from $7\frac{1}{2}$ to 22 grains.

(1) Jour. Indiana State Med. Ass'n., December, 1915.

OLIVE OIL.

Experience With Homogenized Olive Oil Mixtures. As Ladd's² experience has convinced him that olive oil homogenized in milk mixtures was well tolerated in the diarrheas due to indigestion and fermentation, he was interested to see if it could not be used safely in the early days of convalescence from infectious diarrheas to supply additional calories and to prevent or lessen the loss of weight which occurs in such cases. The general scheme of treatment was as follows: After the initial period of catharsis and starvation, a fat-free lactic-acid milk, diluted two-thirds or one-half, was given. If the infecting organism proved to be of the Flexner or Shiga type, dextri-maltose was added up to 4 or 5 per cent. and sometimes barley water. If the gas bacillus was present, no carbohydrates were added. After a period of several days, when the acute febrile disturbance showed distinct signs of subsiding, olive oil was homogenized with the lactic-acid milk, in percentages of 1.00, 1.50 and if well tolerated 2.00, thus adding considerably to the caloric value of the food.

The results briefly summarized were as follows:

There were nineteen cases of infectious diarrhea on the service, fifteen of Flexner bacillus type, one of the gas bacillus and three undetermined. Four patients died, giving a mortality of 22 per cent., about the same, Ladd was informed as in the other services. Of the fifteen patients who lived, eight were in the hospital on an average of twenty-one days each and lost over their entrance weight an average of 15 ounces. Seven were in the hospital on an average of fourteen days each, and gained an average of 10.7 ounces over their entrance weight. The average net loss of all fifteen surviving patients was therefore only 3 ounces over their entrance weight.

OPIUM.

Analgesia Produced by Opium. The principal opium alkaloids in respect to their analgesic power are arranged by the authors—D. I. Macht, N. B. Herman, and C. S.

(2) *Archiv. Pediat.*, July, 1916.

Levy³—in the following order: Morphine, papaverine, codeine, narcotine, narceine and thebaine. It was found that a combination of morphine and narcotine, and also a combination of the total opium alkaloids is much more effective than the quantity of morphine they contain would be if given alone. It was further found that in a patient of one of the authors showing an idiosyncrasy for morphine, that alkaloid produced a heightening instead of a lowering of the threshold of pain, which phenomenon, however, disappeared on administering morphine in conjunction with narcotine.

Action of Opium Derivatives on the Human Intestine.

From x-ray studies on a series of twelve patients, Henry K. Pancoast and Arthur H. Hopkins⁴ found that there was no uniformity in the phenomena produced by the administration of morphine in varying doses. Small doses produced more marked effects in some cases than large ones did in others. Women seemed to be more susceptible than men. A high spasmodic hour-glass contraction of the stomach was rarely observed and no instance of a similar constriction near the pylorus was seen. In some cases no appreciable changes in the stomach were produced, but in most there was more or less spasm of the pylorus with increased peristalsis and a prolongation of the emptying time. Decreased motility of the small intestine was almost a uniform effect of morphine and seemed to be due to lack of propulsion rather than to spasm. It was most pronounced in the upper portions. The effect on the large intestine was variable and of little significance. The effects from oral administration were practically the same as those from subcutaneous injection.

OXYGEN.

Injection of Oxygen in Tetanus. Experiments were conducted by H. O. Howitt and D. H. Jones⁵ on guinea-pigs, in which the tetanus bacillus was directly inoculated subcutaneously. At once after the inoculation oxygen was injected through a needle into the inocu-

(3) Jour. Pharm. and Exp. Therap., January, 1916.

(4) Jour. Amer. Med. Ass'n., Dec. 25, 1915.

(5) Lancet, April 10, 1915.

lated area and most of the pigs so treated recovered from the tetanus injection without manifestations of any symptoms. Controls all developed the disease and died. The method is easy and free from danger and is suggested as a possible means in treatment of human cases of tetanus.

Oxygen in Treatment of Tuberculous Processes.

Gendron and Bouchet⁶ refer only to tuberculous fistulas and abscesses and state that these show no benefit from the oxygen unless the tuberculous process has an active circulation of blood through it. The first step therefore is to insure this active local circulation of blood, either by superheated air, revulsion from cold water, rubbing or other means. The abscess is then cleaned out and oxygen is introduced directly into the cavity, through a two-way tube, under very slight pressure, and with constant manometer control. In thirty-seven abscesses and nineteen fistulas thus treated, no surgical measures were required. No abscess thus treated entailed a fistula. There are no drugs to be absorbed, while the healing proceeded very rapidly, they report, under the hyperemia and oxygen.

PETROLATUM.

Liquid Petrolatum in Constipation. LeTanneur⁷ points out that a vegetable oil is unable to serve as lubricant for the feces until the amount ingested surpasses the dose normally saponified by the liver and pancreas. Hence to take olive oil for the purpose, as some recommend, imposes, he says, a useless burden on these two organs. Liquid petrolatum, on the other hand, seems to traverse the alimentary canal without exciting any reflex in the liver. Three years of experience with refined liquid petrolatum have confirmed its valuable lubricating action and its healing influence on the minute excoriations from abnormally hard feces. A necropsy on persons who have been systematically taking liquid petrolatum he has found the appendix literally stuffed with it, and adds that its presence in this way guarantees sterility from the microbial point of view. He orders

(6) Bull. de l'acad. de méd., Dec. 28, 1915.

(7) Paris méd., June 24, 1916.

one or two tablespoonfuls a day, after dinner, at night, or before breakfast, keeping it up for two or three weeks, and repeating the course as needed. The physician must realize that in this drug he has at his disposal means for keeping constipation under control without drastic measures; but he must impress on the patient that it is a course of treatment, aiming at a durable cure in time.

PETROLEUM.

Ordinary Kerosene as a Remedy for Laryngeal Diphtheria. Four cases of laryngeal diphtheria in young children ranging from 2 to 4 years of age are recorded by Dr. T. N. Clayton,⁸ in which recovery is attributed to the internal administration of ordinary kerosene or "lamp" oil. Two of the four patients were in such condition that tracheotomy was out of the question. It was not performed in any of these cases. All were treated by injection with anti-diphtheria serum. To each, doses of 30 minims of kerosene oil were given thrice successively every four hours, then 10 minim doses three or four times daily, until normal breathing was established, which occurred in all four cases in forty-eight hours. From the first dose the breathing became easier, improving with each successive administration, until it became tranquil. In no case was any untoward action of the petroleum observed. The author is inclined to give the chief credit for the four recoveries to the petroleum administered. Similar cases previously treated with anti-toxin, without petroleum, had been lost. Two of them were practically *in extremis* when first treated with the oil. The author is convinced that if petroleum were administered in the conditions variously diagnosed as spasmodic croup, membranous croup or laryngeal diphtheria, many lives would be saved. The taste of the kerosene was disguised by means of compound decoction of sarsaparilla.

PHENOL.

Phenol in Meningitis. As a last resort in acute cerebrospinal meningitis in two sisters aged 8 and 11, Bel-

(8) Brit. Med. Jour.

lotti⁹ gave them subcutaneous injections of phenol and morphine according to Baccelli's method of treating tetanus. The dose was 0.01 gm. of phenol with 0.005 gm. or half this amount of morphine, dissolved in 1 gm. of distilled and sterilized water. This dose was repeated during the day and following days until the children had taken 0.75 gm. of the phenol without the urine turning black or any other symptoms of phenol poisoning manifesting itself. Most of the subcutaneous injections were made by the mother whenever the fever began to go up or the pains to increase. Improvement was evident after a few injections, and by the twentieth day the children were able to sit up and play and the cure was soon complete without complications. The subcutaneous route seems best adapted for the purpose of phenol injection.

Alcohol Not an Antidote for Phenol (Carbolic Acid).

The results of a series of experimental investigations relative to phenol poisoning and the antidotes ordinarily used in cases of this kind are related by Macht.¹ His findings suggest a revision of ideas relative to the value of the various antidotes for carbolic acid. Of late years alcohol has been used probably more than any other substance for this purpose. The studies of Macht seem to show that not only is alcohol useless, but it actually increases the danger, because it hastens absorption. His studies also show that lavage with alcohol was followed by death oftener than by recovery. When large doses of phenol had been given by mouth, washing the stomach with alcohol was followed almost invariably by death, in the experiments which he made upon cats.

The remedy which proved most effective as an antidote, in Macht's experience, was a solution of sodium sulphate. Dogs, he declares, withstand carbolic acid better than cats, and he found it possible to save these animals by means of immediate lavage, irrespective of the remedy employed. After large doses of phenol, washing with sodium sulphate or plain water sometimes saved life. In late lavage—that is, if the stomach was washed about fifteen minutes after the ingestion of the carbolic acid—sodium sulphate gave the best results, plain water the

(9) *Gaz. d. Osp. e d. Clin.*, August 13, 1915.

(1) *Bull. Johns Hopkins Hosp.*, April, 1915.

next best, while, as already stated, the use of alcohol was almost invariably followed by death.

Macht agrees with Tauber that sodium sulphate is effective, because it hinders absorption. Also, through its purgative action it rids the body quickly of the poison. Magnesium sulphate can be used for the same reason as the sodium sulphate, but the possibly depressing effect of magnesium ions in case of absorption is a disadvantage. However, when the sodium sulphate is not accessible, the magnesium sulphate, being usually at hand, may be employed in its place.

The moral of these observations is that we should beware of washing out the stomach with alcohol when carbolic acid has been taken by the mouth. It is not denied, of course, that applications of alcohol to the skin or external tissues, after carbolic acid is applied, may be of value in preventing carbolic acid burns.

Treatment of Diphtheria Carriers With Iodized Phenol. W. O. Ott and K. A. Roy² announce that the cases reported consist of carriers convalescent from clinical diphtheria in the infectious ward of the Charity Hospital, New Orleans, and some that did not have diphtheria but were persistent carriers. In all cases reported iodized phenol (*acidum carbolicum iodatum* of the N. F.) was used. It contains 60 per cent. phenol (carbolic acid), 20 per cent. iodine crystals, and 20 per cent. glycerine. In pharyngeal cases, the tonsils, uvula and posterior wall of the pharynx were swabbed every forty-eight hours until negative cultures were obtained. In nasal cases, the entire anterior part of the nasal cavity was swabbed with iodized phenol every forty-eight hours. Care was taken not to allow the preparation to run over the face or drop into the larynx. Cultures were always made a few minutes before the local application. In this way, forty-eight hours elapsed after each application of iodized phenol before another culture was made. Seventeen persons were treated. Negative cultures were obtained after one application of iodized phenol in six cases (35 per cent.); after the second application in five cases (29 per cent.); after the third application in two cases (12 per cent.); after the fifth application in one case

(2) Jour. Amer. Med. Ass'n., March 11, 1916.

(6 per cent.), and after the sixth application in two cases (12 per cent.). One case (nasal) was under treatment for twenty-one days and required nine applications before negative cultures were obtained. With the exception of this case, none of the other sixteen patients were under treatment longer than eleven days.

PHENOLPHTHALEIN.

One Thousand Doses of Phenolphthalein. J. C. McWalter³ states that he has prescribed something more than 1,000 doses of this drug and finds it particularly useful in cases of intestinal toxemia. It offers ideal advantages because what is required is a mild antiseptic, capable of being taken for a considerable period without toxic or cumulative effects, and yet free from those irritating effects on the mucous membrane of the intestine which renders most purgatives harmful in these cases. In mucomembranous colitis phenolphthalein, in doses of $\frac{1}{2}$ grain daily, will be found eminently satisfactory in preventing enterospasm, easing pain, checking the excessive secretion of mucus, improving the neurasthenia, and generally improving the patient's condition.

PICRIC ACID.

Picric Acid in Treatment of Pellagra. W. T. Wilson⁴ calls attention to the value of picric acid, administered internally, in the treatment of pellagra. The results obtained with this drug in 100 cases of his own and in 100 additional cases of other physicians are reported. The author's patients ranged in age from 16 months to 82 years; no case was diagnosed as pellagra in the absence of the characteristic skin lesions, either in dry or moist form. The dose was $\frac{1}{2}$ dram (2 c.c.) of a 1 per cent. solution of the acid, administered at intervals of three, four, or six hours. It is suggested that the pharmacist be directed, in making the solution, to place the acid in a mortar, next add some water, then some alcohol, and finally, enough water to make up the required volume;

(3) *Lancet*, Nov. 20, 1915.

(4) *Texas Med. News*, August, 1915.

17 per cent. of alcohol is required to make a clear solution. In severe acute cases, 1 dram (4 c.c.) of the 1 per cent. solution was given ever six hours for a few days, and the dose then reduced. Evidences of disturbance of the heart or kidneys indicate a reduction in dose. In most of the author's recent cases a gargle of 0.5 per cent. picric acid solution was also prescribed. In mixed infection of the hands and feet local dressing with picric acid gauze seemed beneficial.

The results constanly obtained from the picric acid treatment were as follows:

Control of oral symptoms and other symptoms involving mucous membranes in from five to seven days; control of abdominal pains, about three days; of intestinal disturbance, from ten to fourteen days; and of the eruption, in about three weeks. Relief from toxic symptoms was procured in two weeks, and from insanity, in three weeks. The treatment soon placed the patient in a condition to take food without pain. Digestion soon became normal, and the return of appetite was found to mark the beginning of convalescence. Of the 200 patients, only three died—two of tuberculosis and one of nephritis—and only eight patients showed recurrence. These had been treated only a short time, and responded at once when the medication was resumed. In two cases the picric acid treatment was followed by disappearance of all symptoms except the diarrhea which apparently was increased. Relief from severe local burning was in many instances obtained by the external use of a 2 per cent. solution of picric acid.

In the feeding of pellagra patients, egg albumin comes first in nutritional value. Egg strained through gauze is easily taken. Buttermilk is the next best article of diet. When improvement begins, great care should be taken in increasing the food supply, as too hasty methods often bring on an attack of acute indigestion, together with other evidences of a return of the disease. Idiosyncrasies in the taking of food being frequently encountered, selection of the foods best suited in individual cases is necessary. Personal supervision of the convalescent's diet is a vital point of the treatment, as written instructions are worse than useless. Sweet milk if given, should

be diluted or pasteurized, and whenever gastric symptoms appear the stomach should be at once washed out and a change in the diet made.

PNEUMOSAN.

Pneumosan in Pulmonary Tuberculosis. Using this preparation in conjunction with the usual general hygienic and dietetic treatment, A. E. A. Carver⁵ has secured satisfactory results in a series of 103 cases. Of these patients 31 per cent. lost the bacilli from the sputum under treatment; 71 per cent. of the patients in the first or second stages of the disease showed marked improvement or had the disease arrested after treatment for about a year and a half. The results seem to warrant further use of the drug, particularly in view of the fact that no untoward effects have followed its administration.

QUININE.

Quinine in Conjunctivitis. As the result of extensive experience, begun before the days of diphtheria antitoxin, John Tweedy⁶ recommends the local application of solutions of quinine in cases of infected and sloughing corneal ulcers and in many cases of infected conjunctivitis.

Quinine in Chronic Mild Fever. Rummo and Ferrannini⁷ refer to cases that seem to be common in Italy in which the temperature runs up a trifle above normal at some time in the day, and this keeps up for weeks or months. When tuberculosis and syphilis can be excluded, they have found that a large dose of quinine by the mouth for a ten-day period restores the temperature permanently to normal in 80 or 90 per cent. of the cases. There does not seem to be any specific effect from the quinine but merely an antiseptic and antitoxic influence on the blood which exerts an unfavorable action on all microorganisms with which it comes in contact. Test-tube experiments confirm the inhibiting influence of

(5) *Lancet*, Dec. 11, 1915.

(6) *Brit. Med. Jour.*, Jan. 1, 1916.

(7) *Rif. Med.*, Oct. 9, 1915.

quinine on development of the colon and paratyphoid bacilli and others. A few typical instances of what they call "*febbricole*" are described showing the effectual action of the quinine, with a few refractory cases. Among the latter are two women who have had abnormally high temperature during part of the day, as a rule, for eight or nine years. Serologic tests have been constantly negative and several courses of quinine have not modified the temperature in any way. The daily dose is 1 or 1.5 gm., fractioned, taken while the temperature is at its lowest range. If one course is not effectual, they repeat it after a pause of four or five days. If three of these courses fail they accept the case as refractory and cease to push the quinine. The functioning of the kidneys and liver must be carefully supervised throughout.

QUININE HYDROCHLORIDE.

Quinine Hydrochloride Solution as a Dressing for Infected Wounds. Kenneth Taylor⁸ finds that the clinical experience with quinine hydrochloride has been consistent with the laboratory work previously reported. It has been active in ridding heavily contaminated wounds of the gas bacillus, acting as an antiferment, inhibiting the activity of the putrefactive organisms, and reducing the offensive odor associated with them. The solution does not appear to be precipitated by the serum or discharge from wounds in the case of the 1 per cent. solution. The 0.1 per cent. solution has occasionally shown precipitation without the addition of 0.1 per cent. hydrochloric acid or 1 per cent. of alcohol. The addition of neither of these drugs has appreciably increased the bactericidal activity of the quinine solution *in vitro*, but appears to prevent precipitation of the alkaloid caused by the strongly alkaline discharge present in some profusely suppurating wounds.

QUININE AND UREA HYDROCHLORIDE.

Quinine and Urea Hydrochloride as a Local Anesthetic in Tonsillectomy. The advantages of this solution, according to Louis J. Burns⁹ are that it is absolutely

(8) Brit. Med. Jour., Dec. 25, 1915.

(9) Ann. Otol., Rhinol. and Laryngol., December, 1915.

non-toxic even in as strong a solution as 10 per cent. It always produces sufficient anesthesia to complete the operation without the necessity of stopping to make further application or injection. There is marked diminution of after-pain and discomfort. It has advantages over cocaine and its derivatives, owing to its non-systemic action. There is absence of troublesome primary or secondary hemorrhage. It may be sterilized readily, frequently recurring high temperature producing no chemical or physiologic change.

Quinine and Urea Hydrochloride for Hemorrhoids. Phenol is the remedy principally used for the injection-cure of hemorrhoids, but Dr. E. H. Terrell¹ gives a preliminary report of thirty-three cases treated by injecting a solution of quinine and urea hydrochloride directly into the piles. Of thirty-three patients, thirty-two were cured, so that there was only one failure. In the latter, there was a history of syphilitic infection and rectal ulceration.

Quinine and Urea Hydrochloride as Local Anesthetic. Samsborsky's² experiments confirm the local anesthetic action of this drug which he used in a 1 per cent. solution in 40 c.c. dose. With such doses he never observed any toxic effects, but the tissues became edematous at the place of the injection, and the surgical cut showed marked hyperemia. The anesthesia sets in in ten or fifteen minutes after the injection and persists for several hours, while there is slight diminution of sensation for several days. This absence of post-operative pain makes the injection of this quinine preparation valuable, but the motor nerves should be avoided for fear of their possible paralysis. He used this drug in thirty-eight cases of various disorders. Only in three very old people the healing of the edges of the wounds was unduly protracted, and in one of these patients gangrene developed.

Quinine and Urea Hydrochloride in the Toxemia of Pulmonary Tuberculosis. Myer Solis-Cohen³ considers that the treatment of the advanced stage of pulmonary tuberculosis presents the greatest difficulties and dis-

(1) Virginia Med. Semi-Month., June 25.

(2) Russkiy Vrach., vol. xiv, No. 20.

(3) New York Med. Jour., Feb. 26, 1916.

appointments. The most distressing and uncontrollable feature in this stage is the toxemia, and while fresh air, rest, and good food are always indicated they do not constitute the whole treatment. Among the drugs which have a controlling effect on the toxemia is the hydrochloride of quinine and urea. In very many cases the administration of this drug will cause a reduction of the fever and an amelioration of the toxic symptoms. Every patient will not respond to this treatment, and the same patient may respond at one time and not at another. It is not a specific, and one who expects invariably favorable results will be disappointed. Cohen is unable to say why in some instances it gives brilliant results while in others it fails. The drug is given in capsules, and the dose may be 5, $7\frac{1}{2}$, or 10 grains administered every three or four hours, or three times, or twice, or once a day. Doses and intervals depend upon the effect produced. After the reduction of the fever a smaller dose and longer interval may be tried, and this must always be done upon the advent of cinchonism. If no effect is produced by a given dose it should be increased.

ETHYLHYDROCUPREIN (OPTOCHIN).

Ethylhydrocuprein in Scarlet Fever and Measles. Hirschfelder and Schultz,⁵ both of the University of Minnesota, speak of the good results from the use of this quinine derivative in pneumococcus sepsis, both as prophylactic and curative. Giemsa and Werner, Izar and Nicosia have shown its great superiority over quinine in malaria. Having obtained some of the drug from Professor Morgenroth the authors have been testing it in scarlet fever and measles. In the former no favorable influence on the course of the disease was noted. The fever even lasted a little longer than in control cases. The results in measles were different. Whereas in control cases the duration of the fever averaged practically eight days, under the use of the drug the duration was almost cut in half (4.3 days). The dose was from $1\frac{1}{2}$ to 3 grains three times daily. The drug was tested in experimental rabies and experimental vaccinia with negative results.

(5) Berlin. klin. Wochenschr., Sept. 20, 1915.

Treatment of Pneumonia With Ethylhydrocuprein.

Lowe and Meyer⁶ have treated forty-three military cases of pneumococcus infection with this remedy. The crisis in pneumonia is due to the formation of immune bodies, which so weaken the virulence of the infection that the leukocytes can attack and destroy the pneumococcus. In theory, therefore, pneumonia should be treated with an antiserum and some chemotherapeutic remedy which can stimulate leukocytosis. Of the forty-three cases all but two were pneumonias, the exceptions having been pneumococcus meningitis. Of the pneumonias twenty-eight were primary and single, eight primary and double, while the remainder were associated with measles, recurring in an empyema case after operation and the other in the measles case. These patients, naturally vigorous, were much worn with forced marching and other hardships and showed nervous collapse, dilatation of the heart, and other complications. In fact every case treated was severe in type. Aside from the Romer serum and ethylhydrocuprein the patients received digitalis, caffeine, camphor, oxygen inhalations, morphine, and large quantities of alcohol. The duration of the fever averaged one week. A crisis almost invariably set in, but passed into a lysis. Most of the credit is awarded to the ethylhydrocuprein, and especially in the meningitis cases. The majority of patients received about 4 grains of the drug from four to six times daily. No disorders of vision were noted. The quantity should perhaps be somewhat higher—from six to eight doses daily—and when given at the onset of the illness the authors feel much confidence in its ability to control the disease.

Bactericidal Action of Ethylhydrocuprein on Pneumococci. Henry F. Moore⁷ continues his experimental studies on ethylhydrocuprein. He has shown previously that ethylhydrocuprein inhibits the growth of and kills pneumococci *in vitro* in very considerable dilutions of the drug, and that it exerts a considerable protective action in experimental pneumococcus infections in mice. The drug is a derivative of hydroquinine.

(6) Berlin klin. Wochenschr., Sept. 27, 1915.

(7) Jour. of Exp. Med., November, 1915. An abstract of previous articles by Moore on this subject appears in Vol. VIII, 1915, p. 62.

The following are Moore's conclusions from his present experimental work:

1. The serum of rabbits which have been previously treated with a single dose of ethylhydrocuprein (optochin) exerts a bactericidal action on, and, later, inhibits the growth of pneumococci in the test tube.

2. These actions are most evident in the serum of rabbits when the base (optochin base) is given in oil subcutaneously; somewhat less when the hydrochloride of the drug is given in water subcutaneously; slight when the base is given in oil intramuscularly; and least evident, or absent, when the hydrochloride in water is introduced directly into the stomach. To get these effects by the intravenous route, toxic doses must be given, and, even with toxic non-fetal doses, the effects do not last long.

3. In the case of the base given in oil subcutaneously to rabbits in a dosage of 0.1 gram per kilo of body weight, the bactericidal action of the serum is at its maximum about one hour after administration, and it passes into an inhibitory effect about four hours after the drug has been given.

4. In man the same inhibitory and bactericidal actions of the serum are present when a single dose of 0.5 gram of the hydrochloride of the drug is given by the mouth or subcutaneously, but the bactericidal action is not so marked as in rabbits.

5. When the optochin concentration in the serum has apparently diminished to a certain point in relation to the number of pneumococci present, the pneumococci which have survived the bactericidal action for a few hours acquire the power of growing freely.

A Year's Treatment of Pneumonia With Ethylhydrocuprein. Silbergleit⁸ has treated forty-nine cases of pneumonia with this alleged chemotherapeutic remedy and lost five of them (10.2 per cent.). Before this period he had treated forty-five consecutive cases without this medicament and had lost four, or 10 per cent. In this latter series all of the decedents had been interned on the first day of the disease, which was not the case with the ethylhydrocuprein series, only one of the five decedents having been interned the first day, the others all

(8) Berlin. klin. Wochenschr., Nov. 29, 1915.

arriving late at about the time the crisis was due. These figures show a slight advantage in favor of the new remedy. In regard to the date of defervescence there was likewise an advantage, but it is safe to say that this quinine derivative has no specific power over pneumonia which is at all comparable with that of quinine over malaria. The number of complications in the series of forty-nine was but one (empyema), with one relapse. There was also an impression in the mind of the medical attendant that the patient was not so very ill. The influence of the new remedy may be compared with that exerted by a good antipyretic, which keeps down the fever and the attendant ills without injury to the patient. The drug is no cardiac roborant, despite the finds of others. It has a bad taste and sometimes causes nausea and tinnitus severe enough to demand the suspension of the treatment. There was a single case of amaurosis. The author believes the remedy a desirable one if it can be begun on the first day of the disease.

The Toxic Effects of Ethylhydrocuprein on the Eye. Attention is drawn by G. H. Oliver⁹ to the fact that it has been demonstrated that in certain infections induced artificially by virulent strains of the pneumococcus the microorganisms can be destroyed and the lives of the majority of the animals saved by the administration of ethylhydrocuprein. Frankel used this quinine derivative in a number of cases of pneumonia, which was then epidemic in Berlin. His results were unsatisfactory as a very disagreeable complication occurred—ambyopia. Oliver describes a similar case in which he was called, and in which disastrous results ensued from the administration of ethylhydrocuprein. The patient took in all 120 grains and practically lost his sight for a year's time from the administration of the drug. After that time he began to improve and has continued to do so up to date. Ophthalmoscopic examination showed both discs now quite white with no trace of color; details not discernible. Vessels seem to have increased in size a little and a few very fine branches may be seen on the discs. Vessels in left eye are smaller than in right eye, and both arteries and veins have a double outline which ex-

(9) Brit. Med. Jour., April 22, 1916.

tends far away from the disc. Apart from these changes, the fundus is normal in appearance. Pupils are dilated and contract very slightly to light and still oscillate. Oliver is afraid that there is little hope of this patient being able to earn his own living in the future. The conclusion is that ethylhydrocuprein is a dangerous drug and its administration is to be carefully avoided. It may happily be discovered that much smaller doses than those given heretofore will suffice to destroy the pneumococcus.

Ethylhydrocuprein Hydrochloride in Treatment of External Eye Diseases. J. S. Wyler¹ reports the results obtained with instillations of this alkaloid in external eye affections other than pneumococcus corneal ulcers, in which its efficacy has already been established. As recently mentioned by Grunert, the drug is of value in acute and mild subacute infections of the lachrymal sac. Wyler reports two cases, with long-standing itching and redness of the eye, in which analogous favorable results were obtained. In the first, much stringy mucus was being secreted, and treatment with various recognized drugs had given no benefit, epinephrine and novocaine alone bringing temporary relief. Instillation of 1 per cent. ethylhydrocuprein hydrochloride solution, every two hours, brought absolute comfort, which persisted throughout the summer under continued use of the drug. In the second case, a 1 per cent. solution, used three times daily, also gave complete relief. In three cases of trachoma a considerable improvement took place under the influence of the drug. Two of these cases showed pannus formation, a 2 per cent. solution of the drug, every three hours, reduced the pannus, and brought relief from pain, gradual diminution of the ulcer, and improvement of vision. Three cases of phlyctenular inflammation in children were most favorably influenced by treatment with a 10 per cent. solution in the office and 1 per cent. solution at home. Two of these cases showed corneal involvement. In all a rapid disappearance of the photophobia was noted. Results from the use of the drug in parenchymatous keratitis were unfavorable and in gonococcus ophthalmia doubtful.

(1) *Lancet-Clinic*, Dec. 25, 1915.

Treatment of Epidemic Meningitis With Ethylhydrocuprein. Friedemann² refers to the considerable rôle of cerebrospinal meningitis in war morbidity, and its high mortality, even under serum treatment. A chemotherapeutic remedy must still be the ideal, for various reasons, in a bacterial disease; hence the striving for substances of bacteriotropic character which shall be readily available for wholesale use, and despite apparent failure with methylene blue, urotropin and the like we must test new remedies in the hope of finding substances of salvarsan efficiency. Ethylhydrocuprein can prevail over the pneumococcus infection in mice and the author, because of its ready applicability through the cerebrospinal fluid, elected to test it in meningitis, with the added reason that *in vitro* this substance is decidedly antiseptic to the meningococcus. The remedy was administered in eight cases of severe, apparently malignant meningitis. Every patient recovered, a result which might possibly have come about of itself in so small a number of cases, but the chance that all of the cases were of the benign type is infinitesimal. Some months before Friedemann had treated a series of sixteen cases of the same disease with serum and had lost eight. The remedy was usually injected once into the cord, while also pushed internally; but two, three and even five injections respectively were used in some cases.

SALICYLIC ACID AND THE SALICYLATES.

Treatment of Septic Wounds With Salicylic Acid. L. G. Anderson, H. Chambers and M. Lacey³ have made observations on approximately 1,000 cases of septic wounds treated in the wards and operation theaters of a military hospital, making large numbers of cultures to determine the bacterial growth in the wounds. From these observations they draw the following conclusions:

1. The bactericidal action of many of the so-called antiseptics when applied to septic wounds is negligible.
2. The majority of wounds heal without the application of an antiseptic, provided free drainage is sup-

(2) Berlin. klin. Wochenschr., April 17, 1916.

(3) Brit. Med. Jour., June 3, 1916.

plied and dressings are changed frequently. Hypertonic saline, in so far as it aids physiologic processes, is preferable to many so-called antiseptics.

3. A strong antiseptic, such as eusol, can sterilize the surface of a wound with which it comes in contact, and, if applied continuously, gives excellent results.

4. Salicylic acid applied in a suitable form can often save cases when other methods have failed. It is particularly useful when dressings can not be repeated at frequent intervals.

5. In all cases in which recovery is delayed and the effect of the reagents of doubtful value the treatment should be controlled by making repeated cultures from the wound surfaces.

Influence of Salicylates on Metabolism. The following results were obtained in a study of three men, on whom W. Denis and J. H. Means⁴ made observations concerning the effects produced by the ingestion of sodium salicylate on the urine, feces, blood and on the respiratory exchange:

In the case of two normal men, the administration of large doses of sodium salicylate (up to 6.6 gm. a day) produced an increase in the excretion of nitrogen, phosphates and uric acid. In one case, this increased nitrogenous metabolism was accompanied by an increase in the basal metabolism and symptoms of salicylate intoxication (such as ringing in the ears). In the other case, a much greater increase in the urinary excretion of nitrogen (which extended throughout the after-period) was observed, but there was no increase in the basal metabolism and no symptoms of intoxication. In one mildly septic individual results similar to those secured with the second normal man were obtained. No change in the respiratory quotient occurred in any of these subjects.

Strontium Salicylate. There being no satisfactory foundation for the therapeutic reputation enjoyed by this salicylate, M. A. Blankenhorn⁵ undertook a clinical study of this drug in comparison with other commonly used salicylates. He found that the average minor toxic

(4) Jour. Pharm. and Exp. Therap., June, 1916.

(5) Jour. Amer. Med. Ass'n., Jan. 29, 1916.

dose was the same as for sodium salicylate; that it produced the same gastric and other toxic symptoms as other salicylates; and that it was no more effectual in the relief of pain than the other salicylates. In addition, its physical properties rendered it less convenient to handle.

Intravenous Injections of Sodium Salicylate in Acute Rheumatism. Pedro V. Cernadas⁶ recommends daily injections of from 1 to 2 grams of sodium salicylate. The solution is made as follows:

Sodium salicylate	5	parts
Caffeine citrate	0.25	part
Distilled water	25	parts

From 6 to 10 c.c. are given daily.

The salicylate must be chemically pure and the solution kept in the dark. It is of special value where medication by mouth is not well borne.

ASPIRIN.

Idiosyncrasy to Acetyl-Salicylic Acid. Seventeen cases are cited from the literature and three reported from O. af Klercker's⁷ own practice in which the therapeutic administration of acetyl-salicylic acid (aspirin) was followed by edema, the lids and face swelling, the skin puffing up sometimes down as far as the chest. In some of the cases there was also a tendency to urticaria, near the swollen patches or more diffuse. In some of the cases the edema involved the mucosa of the nose and pharynx; in two cases there was edema of the larynx. The edema rapidly reached its height and subsided as a rule in twenty-four hours. The doses had ranged from 0.3 to 1 gm., and the pathologic reaction occurred always at the first dose, no matter what amount was taken. Some instability of the vasomotor system is evidently responsible for the trouble, but nothing of the kind had been known in the families before. Some favoring factors were probable in certain cases, applica-

(6) *Semana méd.*, Dec. 23, 1915.

(7) *Hygiea*, 1916, Vol. 78, No. 4.

tion of local heat, fear of poisoning, a pre-existing infection or other coöperating cause. In fact, he is inclined to place considerable stress on the emotional factor in persons with an unstable vasomotor system. In two cases the drug was continued without further mishap. His patients were a boy and girl about 4 and a man of 25. The boy's eyes swelled up so they were entirely closed in half an hour after the first dose. The man had taken a 1 gm. tablet to relieve toothache, and in less than half an hour the lids and region around the eyes swelled until it looked as if a big blister had run around the right eye, and there was some urticaria on the neck. The seventeen cases tabulated were all in adults, including two physicians, who published self-observed case histories.

Acetyl-Salicylic Acid in Febrile Conditions. E. Dupre and P. Merklen⁸ give their opinion, based on clinical experience, that acetyl-salicylic acid (aspirin) is of decided value as an antipyretic drug in acute febrile states such as typhoid fever. Injected daily in a single dose of 15 or $7\frac{1}{2}$ grains (1 or 0.5 gram) or even less, the drug was observed in a number of typhoid cases to produce a prompt and considerable drop in the temperature, amounting sometimes to three degrees C. (5.4° F.) or even more. The effect lasted a few hours, and was accompanied by more or less sweating, followed in turn by a rise in temperature to the pre-existing level. Given at 7 p. m., at the acme of the daily febrile curve, the drug in $7\frac{1}{2}$ grain doses acted somewhat more slowly, *viz.*, after a delay of two hours, the drop being frequently preceded by a slight rise. Once established, however, the fall in temperature continued to about normal, as at other times for the day. Similar and equally marked effects were noted in cases of fever due to acute or subacute tuberculosis. Doses of 15 grains (1 gram) were used in these cases. In no instance were any signs of collapse observed. The drug, if used in small doses, may thus be considered a safe though rapidly and powerfully acting antipyretic. In some typhoid cases in which cold sponging lowered the temperature

(8) Bull. et mém. de la soc. méd. des hôp. De Paris, May 20, 1915.

but a few tenths of a degree, acetyl-salicylic acid carried it down to about normal.

SCARLET RED.

Scarlet Red in Treatment of Gastric and Duodenal Ulcer. From their experience with this remedy in the treatment of cases of peptic ulcer, together with the results in thirty-seven cases already reported, Friedenwald and Leitz⁷ believe themselves justified in drawing the following conclusions:

1. Scarlet red still remains a useful adjuvant in the treatment of peptic ulcer and while it can not by any means replace the usual forms of treatment, when administered in conjunction with them, it adds materially to the effectiveness of the cure.

2. It is of great help when administered in the ambulatory cases, the effect being even more favorable than the usual remedies, such as bismuth.

3. Inasmuch as scarlet red in no way interferes with the administration of other remedies, such as the alkalies or atropine, these may be administered when indicated at the same time and, in fact, the effect of the combination is at times most beneficial.

SPARTEINE.

Value of Sparteine. Pettey⁸ considers that the differences of opinion, with regard to the value of this drug, are due to not knowing the proper dose, which is by some taken to be from 1/10 grain to 2 grains, and by others 1/5 of a grain or less. He regards fractional doses as useless, but believes that doses of from 1 to 2 grains will have a good effect both as a cardiac tonic and a diuretic. The tonic effect on the heart is as great as that of digitalis, but the latter is a vasoconstrictor, whereas sparteine is a vasodilator. According to Pettey, doses of 2 grains are not toxic, and may be given every four or six hours to keep up the full effect of adding tone to the heart muscle, increasing the force of the heart

(7) *Med. Record*, July 22, 1916.

(8) *New York Med. Jour.*, April 3, 1915.

action, and at the same time, by dilating the arterial capillaries, reducing the resistance to be overcome.

Sparteine Sulphate. W. H. Zeigler¹ concludes from his experiments on various animals that sparteine is not a cardiac stimulant, but is a depressant to both the heart and the respiration. Death is due to failure of the respiration, aided by the action of the drug upon the heart muscle.

SODIUM.

SODIUM CHLORIDE.

Treatment of Sciatica by Perineural Infiltration With Physiologic Saline Solution. In February, 1912, W. M. Leszynsky² reported twenty-five cases of this kind, and he has had 135 additional cases since. The number of injections required varied from one to six, and averaged three. Under proper technique and strict asepsis the procedure is harmless, and no complications or unpleasant symptoms have ever been encountered. His larger experience has confirmed the opinion previously expressed as to the marked value of the treatment. Several patients have not reacted satisfactorily, or have not given the plan an adequate trial, but they have been exceptions. He does not recommend this treatment in every case, for many patients are relieved and recover under the customary therapeutic measures. In subacute and intractable cases, however, it has proved the most satisfactory addition to the means of treating sciatica which has yet been devised; and it has not up to the present received the recognition its importance merits.

In the technique followed by Leszynsky the patient lies on the abdomen with the legs fully extended and the feet projecting beyond the edge of the table; a firm pillow is rolled and placed under the lower part of the abdomen in order to favor relaxation of the gluteal muscles. For the purpose of locating the nerve the following measurements are taken: A line is drawn from the sacro-coccygeal articulation to the postero-external

(1) Southern Med. Jour., August, 1916.

(2) Med. Record, Feb. 6, 1915.

border of the great trochanter; at the junction of the inner one-third and the outer two-thirds of this line is found the spine of the ischium, and one inch to the outer side of this point, the point of puncture is located. Before inserting the needle an area of the skin about 4 cm. in diameter is painted with tincture of iodine, but no anesthetic is employed. From 80 to 120 c.c. of sterile saline solution are used for one injection.

Gubin¹⁰ obtained excellent results in the treatment of sciatica with rectal injections of salt solution (1.4 teaspoonful sodium chloride to two glassfuls of hot water) with the drop method. He used this method in seven patients and all recovered. The general reaction was profuse sweating and increased diuresis. A detailed report of one case with the description of the method, and illustrations, is given.

Iced Normal Salt Solution in Gonococcus Conjunctivitis. Edward B. Heckel⁸ spoke favorably of this new local treatment of virulent gonococcus conjunctivitis. He referred to the fact that ice-pads have for a long time been used in treatment of this disease, on the theory that cold would inhibit bacterial growth. In view of this, and on the assumption that gonococci are found only in superficial tissues, he has used iced normal saline solution in a few cases. He firmly believes that it is a specific mode of treatment for virulent gonococcus conjunctivitis. He has found it to be harmless, an effective germicide, easily applied, and well borne.

Hypertonic Saline Solution in Gynecology. Clifford White² states that the use of hypertonic saline solution is being attended with such success in the treatment of septic shell wounds that it may not be out of place to draw attention to the value of such solutions in the treatment of surgical affections of the female pelvis. He has been using a solution made of 4 drams of sodium chloride and $\frac{1}{2}$ dram of sodium citrate to each pint of water as a vaginal douche in all inflammatory and septic cases in which a douche is required and finds that the effect is better than that of the antiseptic douches pre-

(3) Russkiy Vrach., vol. 14, No. 38.

(1) Meeting Med. Soc. State of Penn., September, 1915.

(2) Lancet, Oct. 30, 1915.

viously employed. In puerperal cases with sloughing of the perineum and vagina the effect is wonderful. In gynecology all forms of infected and congested pelvis respond well, such as salpingitis, cellulitis, gonorrhea, vaginitis, and erosions of the cervix. Among the most striking results is the way in which a carcinomatous cervix cleans up before operation. In cases in which drainage by abdomen is necessary on account of acute infection the results of saline irrigation of the drainage track have been highly satisfactory.

General Therapeutic Use of Saline Solution. M. Englaender³ reports favorable results from the intravenous injection of doses of 100 c.c. of a 2 per cent. solution of sodium chloride in a variety of conditions. Benefit resulted in typhoid fever, in a case of rheumatism and serositis, influenzal infections, muscular rheumatism, and pneumonia. The mechanism of the beneficial action is not known and the author offers no theories. The immediate result was often a chill, a rise of temperature, and even nausea, vomiting, and collapse. These effects were only transitory, however, and were followed by a fall in the temperature to normal and an improvement in the patient's condition.

Uses and Abuses of Normal Saline Solution. A. D. Willmoth⁴ says that in surgical practice salt solution attains its highest degree of usefulness in the treatment of hemorrhage, first to replenish the circulating medium, second by refilling the blood-vessels and thereby permitting the mechanical acts of the circulation to proceed. It is also valuable in shock, where, by the addition of adrenaline, from 1 to 20,000 to 1 to 10,000, the effects are quickly obtained when the solution is administered by the intravenous method; the heart and blood-vessels are stimulated so that the blood which has accumulated in the large abdominal vessels is put into active circulation again. If urinary excretion is small and the kidneys are not diseased, saline solution furnishes a remedy which increases renal activity; the function of the skin is also markedly enhanced. Last, but by no means the least, is its use in sepsis. The Fowler position, saline

(3) Med. Klin., Jan. 2, 1916.

(4) Amer. Jour. Surg., May, 1916.

proctoclysis, the use of iodine and saline within the abdomen to convert the peritoneum from an absorbing into a secretory surface, will save many patients whose condition otherwise would be hopeless.

Its abuses Willmoth gives as follows:

In no circumstances should saline solution be used in apoplexy, arteriosclerosis, pulmonary edema, dilated right heart, threatened sudden death and sudden collapse from chloroform or ether narcosis, the last two conditions requiring more rapid measures. In the light of our present-day knowledge, it should not be used in uremia.

In conclusion, Willmoth states that no more than 50 grains of salt to 100 pounds of body weight is required to kill a dog, and Lazarus Barlow has shown that if too large quantities are used a condition of hydremic plethora may be induced and the specific gravity of the blood reduced from 1,064 to 1,054. In an attempt on the part of the kidneys and lymph channels to excrete promptly the excess of fluid, they "overshoot the mark" so that eventually the specific gravity reaches 1,067 (Short: "Newer Physiology in Surgical and General Practice"). If elimination can not be carried on fast enough, some degree of dropsy may occur, and as the Greenbaums have shown, it takes on the form of edema of the lungs; especially is this likely to occur in nephritic patients. Not more than from 30 to 40 ounces should be used at any one time, and this should be followed by further injections if need be to prevent reversal of effects.

Sea Water in Treatments of Wounds. Maurice de Fleury⁵ asserts, from the experience in the treatment of 1,500 wounds, that most of the antiseptics in common use are often entirely useless and sometimes even retard tissue repair. The number of cases in this series in which tincture of iodine, hydrogen dioxide, or potassium permanganate proved of distinct value was small. Sea water, diluted to isotonicity with the tissue fluids, *i. e.*, so as to contain 0.7 per cent. of sodium chloride instead of 3.3 per cent. as in pure sea water, proved to be an excellent fluid for irrigations and dressings in the majority of wound cases. The sea water employed was

(5) Bull. de l'acad. de méd., July 13, 1915.

collected some distance from the shore at a depth of 3 or 4 meters, and was sterilized by boiling for twenty minutes and also filtered before use. In irrigating discharging, soiled, and infected wounds, the diluted sea water was freely poured on either hot, lukewarm, or cold, according to indications, and comparative tests in which smaller amounts of hydrogen dioxide solution were employed, led to an impression of the greater efficacy of sea water. Daily copious irrigations exerted a most satisfactory detergent effect, causing the tissues to assume a rosy tint, reducing suppuration, and manifestly accelerating repair. In dressing wounds, sterile gauze and absorbent cotton wet with diluted sea water were used, a layer of non-absorbent cotton being then applied to slow evaporation. In deep wounds or infective conditions of the extremities, local baths in hot sea water, with or without the addition of a little iodine, were ordered given one or two hours before the surgeon's visit. In atonic, slowly healing wounds, injection of from 80 minims to 5 drams (from 5 to 20 c.c.) of isotonic or slightly hypertonic sea water into the surrounding healthy cellular tissues was found to produce a most striking acceleration in the processes of repair. In two cases of extensive infection with septicemia and alarming general condition, intravenous injections of from 5 to 10 ounces (from 150 to 300 c.c.) of diluted sea water were of manifest assistance in lowering the temperature and improving the systemic condition. Wet dressings of slightly hypertonic sea water were found to exert a favorable influence on the course of lymphangitis and in promoting absorption of hematomas with a tendency to suppurate. Daily immersions in hot sea water to which iodine has been added gave satisfactory results in the treatment of contusions, sprains, synovitis, hyarthrosis, hemarthrosis, peri-arthritis, and ankylosis. Finally, in numerous superficial wounds with such extensive skin losses that epidermic grafts seemed indispensable, surprisingly rapid repair without grafting was invariably obtained with the aid of sea water dressings.

Ozonized Isotonic Sea Water in Treatment of Wounds. At a recent meeting of the *Société de bio-*

logie, Paris, R. Guyot and C. M. Rogues⁶ reported favorable results from the use of sterile isotonic sea water in dressing wounds. Isotonicity with the body fluids is obtained by diluting the sea water with pure water sterilized in the autoclave. Further sterilization is procured by means of ozone, of which 8.7 grams are used in the treatment of every cubic meter of water. According to the clinical observations made, the resulting ozonized water exerts a marked effect in accelerating tissue healing.

Injections of Deep Sea Water and Radium. F. T. Park⁷ reports the use of injections of from 10 to 200 c.c. sea water into the back, sides of the abdomen, and the hollow space of the thigh behind the great trochanter in neurasthenia, psoriasis, chronic eczema, and convalescence. The water is taken at a depth of 100 feet and is made permanently radioactive by the addition of 5 micrograms of radium barium bromide solution to every 1,000 c.c. of a mixture of three parts sea water and five parts spring water. This method was first advocated by R. Quinton.

SODIUM CITRATE.

Sodium Citrate Useless in Prevention of Peritoneal Adhesions. Sodium citrate solution Straus⁸ found is of no value at all in preventing the reformation of adhesions which have been separated. It is of little if any value in preventing the primary formation of adhesions, and may interfere somewhat with wound healing.

Sodium Citrate Transfusion for Hemorrhage. The first patient whose case is cited by Hempelmann⁹ had been bleeding from the bowels for seven days and seemed to be in a dying condition. The physicians in attendance had used morphine, horse serum, saline solution and all the remedies usually employed to check hemorrhage, but without success. A sodium citrate transfusion of 250 c.c. was carried out; the bleeding ceased and the man made an uninterrupted recovery. The second patient

(6) Presse m^ed., April 13, 1916.

(7) Med. Record, April 29, 1916.

(8) Surg., Gynec. and Obstet., May, 1916.

(9) Missouri State Medical Ass'n. Jour., May, 1916.

was a man whose septum had been removed. He had been given calcium forty-eight hours prior to the operations. Eight hours after the operation the patient vomited a large quantity of blood and the nose was repacked. However, in spite of this and of morphine, saline solution, horse serum, etc., the oozing continued uninterruptedly for nineteen hours after the first vomiting of blood. The patient was almost exsanguinated by this time; 320 c.c. of citrate blood were injected. The patient improved immediately and made an uninterrupted recovery. In each case the transfusion was followed by slight fever which lasted only a short time.

Sodium Citrate Method of Indirect Transfusion of Blood. Simons¹⁰ is of the opinion that we are not yet in a position to discard the direct for the indirect transfusion. In spite of the difficulties in technique attending the former, he believes that it would be better to obtain the services of one skilled in arterial surgery. There is no reason to believe that hemoglobinuria may not occur with either type of transfusion with equal frequency. Having had the experience of a large number of direct transfusions, he says that shock is a negligible factor, that infarction occasionally occurs (lung, kidney), and that hemoglobinuria is quite common and may occur even when the tests *in vitro* are negative.

Sodium Citrate in Direct Blood Transfusion. C. B. Schildecker¹ states that there is nothing to preclude the use of sodium citrate to prevent coagulation of the blood in direct transfusion. The salt is without toxic action in the amount necessary for this purpose. To facilitate transfusion he has devised an apparatus consisting of a glass-stoppered graduated cylinder with lateral outlet tubes near the top and bottom. Two glass cannulae, one fitting over and the other within the lower outlet tube, are also used. In beginning the transfusion the larger cannula is introduced under aseptic precautions into the vein of the donor and the small one into the vein of the recipient. The apparatus is then connected with the cannula in the vein of the donor, 5 c.c. of a 10 per cent. sodium citrate solution placed in the cylinder,

(10) Jour. Amer. Med. Ass'n., Oct. 16, 1915.

(1) Amer. Jour. Obstet., November, 1915.

and the blood allowed to run in gently, good admixture with the citrate solution being effected with a glass rod. When the required amount of blood has been obtained, the clamp on the vessel is tightened, the physician's thumb placed on the side tube, and the apparatus transferred to the arm of the recipient, when the blood is allowed to run in. Advantages of this method are that the whole procedure is visible through glass, that it can be completed in ten minutes, that it can be carried out by the relatively inexperienced and in a private office or dwelling, and that the quantity of blood taken and transfused can be exactly measured.

Sodium Citrate in Transfusion of Blood. According to Carter's² experience sodium citrate seems to be a satisfactory anticoagulant when used in the cylinder of direct transfusion in 2 per cent. solution. Transfusion can be continued from 2.5 to 3 times longer with a 2 per cent. citrate solution than can be done with physiologic salt solution. A solution of sodium citrate is as efficient, Carter thinks, as a solution of hirudin, as shown by the amount of blood transfused or by the time of transfusion. Sodium citrate does not lessen the coagulability of the blood and is not toxic in the amount used either for direct or indirect transfusion. The coagulability of the blood is temporarily increased immediately after transfusion in which sodium citrate is used, either by the direct or indirect methods. The lethal dose of sodium citrate in dogs is about 1.0 gm. per kilogram of body weight when dilute solutions are injected. Even when a concentrated solution is used it is not more than 0.5 gm. per kilogram. A 0.2 or 0.3 per cent. solution of sodium citrate is sufficient to prevent coagulation and does not have any toxic effect in the amount used for indirect transfusion in man.

Intravenous Injections of Sodium Citrate. According to A. L. Garbat,³ before the adoption of the sodium citrate method of transfusion as developed by Lewisohn and Weil can become universal, two points of prime importance will have to be definitely established: (1) Is the sodium citrate *per se* harmful? Can it be repeatedly

(2) Southern Med. Jour., May, 1916.

(3) Jour. Amer. Med. Ass'n., May 13, 1916.

injected? (2) Is the blood when suspended in sodium citrate and transfused still viable and able to functionate? The last question will be answered by more numerous statistics than are at present available. So far, most of the reports show encouraging results. From Garbat's experience of forty transfusions at the German Hospital, the beneficial effects compare favorably with those obtained by methods in which unmixed blood is used. In four patients not suffering from anemia who received repeated intravenous injections of a 2 per cent. solution of sodium citrate in distilled water, Garbat states that by far the majority of the injections were well tolerated and were not followed by any apparent untoward symptoms. The examination of the urine showed no evidence of renal irritation. Thus it was concluded that sodium citrate *per se* is not harmful, even if repeatedly injected over a long period of time. These conclusions are then reached by Garbat:

1. The sodium citrate method of transfusion is not to be considered in any way dangerous because of the sodium citrate employed.

2. A 0.25 per cent. solution of sodium citrate has been found more reliable in preventing coagulation.

SODIUM HYPOCHLORITE.

Sodium Hypochlorite in Treatment of Septic Wounds.⁴ F. J. A. Dalton⁵ submits the report of the committee sent to the Gallipoli peninsula to make observations on the efficacy of hypochlorites in the treatment of infected wounds. This report describes the preparation of the hypochlorite solution, the methods of use, cites a number of cases, and concludes that the advantages observed in the use of the sodium hypochlorite solution in the treatment of septic wounds are as follows:

1. The simplicity and cheapness of preparation of the antiseptic.

2. Being non-toxic and non-irritating to the tissues when properly prepared according to Dakin's formula, the hypochlorite solution may be safely used in large

(4) Other abstracts on this subject appear in Practical Med. Series, Vol. II, 1916, p. 53.

(5) Brit. Med. Jour., Jan. 22, 1916.

quantities over long periods of time without ill effects.

3. The deodorant action of the solution is remarkable. The fetor from gangrenous tissues usually disappears in twenty-four hours.

4. The rapidity with which sloughs separate and clean granulation tissue is formed in a wound under its influence.

5. The infrequency of redressing required by cases treated as described with hypochlorite, compared with the constant change of dressings required in large wounds with other forms of antiseptic.

6. The fact that injections of the hypochlorite solution into the rubber tubes used in the dressings may with safety be entrusted to very imperfectly trained orderlies without fear of ill results, once the case has been adequately dealt with by the surgeon.

SODIUM NUCLEINATE.

Sodium Nucleinate in Dementia Praecox. C. F. Read⁶ reports ten cases treated with this drug in the Chicago State Hospital with varying success. Donarth's method was used, wherein a 10 per cent. solution in physiologic saline with small amounts of sodium cinnamate is injected under the skin of the abdomen in doses of from 5 to 40 c.c., with an average dose of 25 c.c. The interval between injections was usually one week.

SODIUM PERSULPHATE.

Sodium Persulphate in Tetanus. Lumière⁷ has studied for years the action of oxidizing agents on tetanus toxin. The results *in vitro* and also in the guinea-pig, dog, goat and ass have all demonstrated, he states, that the greatest destruction of the toxins is realized with the alkaline persulphates. His experiments on hundreds of animals all testify to the superior efficacy in this respect of sodium persulphate. It displayed always a favorable action, attenuating or suspending completely the spasmodic contractions. During the thirteen years before the war

(6) Med. Record, Jan. 15, 1916.

(7) Lyon Chirug., October, 1915.

this drug was used at Lyons in eight clinical cases, and six of the patients recovered. When tetanus became so frequent during the first months of the war, thirty-three tetanus patients were given an intravenous injection of 20 c.c. of a neutral 5 per cent. solution of sodium persulphate once or twice a day as indicated. The spasms were considerably attenuated or entirely arrested, but the permanent contractions did not seem to be influenced. The trismus, the contracture of the abdominal wall and the stiffness of the neck persisted, but the patients had no further convulsions and lay quiet and tranquil. Even this is a great gain. Forty-one cases are tabulated; eight patients did not receive the sodium persulphate; four died of their wounds when the tetanus seemed under control; sixteen recovered and thirteen died. The tables show that the incubation period in the cases of recovery ranged from nine to twenty-seven days; in the fatal cases, from five to thirteen days, omitting the cases of flaring up of the infection after an operation. A number of cases of tardy tetanus developing after an operation suggest the necessity of repeating the preventive dose of antitetanus serum as a preliminary to further surgical intervention.

SODIUM SULPHATE.

Sodium Sulphate in Dysentery and Cholera. Ghigoff⁸ has treated by this means 286 patients with dysentery or cholera, including 128 quite severe cases. Only thirty-eight died, and he regards this as evidence that many were saved by this remedy. The sodium sulphate is given in a 20 per cent. aqueous solution, with a little opium. A tablespoonful of this is taken every two hours. Sometimes he gives a calomel purge first and then the sodium sulphate. With incessant vomiting, the sulphate is given in a dose of 30 c.c. dissolved in a glass of tepid water; it is taken all at once.

Sodium Sulphate in Dysentery and Infantile Diarrhea. According to W. J. J. Arnold⁹ infantile diarrhea is closely allied to bacillary dysentery and is therefore

(8) *Wien. klin. Wochenschr.*, vol. 28, No. 33.

(9) *Brit. Med. Jour.*, Jan. 8, 1916.

amenable to the same treatment. This consists in an initial dose of castor oil, to be followed by from 5 to 15 grains of sodium sulphate, every two or three hours, for a child under one year old. Milk should be withheld for several days. This treatment has reduced the mortality from infant diarrhea in the author's practice to an almost negligible factor. In bacillary dysentery in adults, the best results are to be obtained by giving 1 dram doses of sodium sulphate every hour or two. The intervals should be lengthened as the tenesmus decreases and blood and mucus disappear, but the drug should be kept up for some time after both blood and mucus have entirely disappeared. Amebic dysentery responds well to the same method of treatment, but emetine should be given if amebas are found at the end of the treatment.

STOVAINE.

Spinal Anesthesia With Stovaine. J. S. Read¹ has used spinal anesthesia with stovaine in a series of fifty cases of genito-urinary surgery. The solution used is that devised by Babcock, stovaine 0.08, lactic acid, 0.002, alcohol 0.2, and distilled water 1.08.

For urologic operations the third or second lumbar interspace is selected, as complete anesthesia is secured and the danger of depressing the cardiac and respiratory centers is considerably increased when injections are made in the higher spaces. This particular preparation has a lighter specific gravity than the spinal fluid, consequently the needle having been quickly withdrawn, the patient is laid flat on the table and the head and shoulders are lowered to prevent blocking of the upper nerve roots, and sometimes interference with the respiratory and cardiac centers. In this series of fifty cases no symptoms of severe cardiac or respiratory depression occurred. The rapidity with which anesthesia may be obtained by this method and the small degree of post-operative shock and discomfort make this the method of choice in many cases. In cases of phthisis, or other

(1) New York Med. Jour., Jan. 15, 1916.

pneumonic involvement, and in the presence of kidneys which are damaged or not functioning freely, it is of great advantage.

STROPHANTHUS.

Action of Strophanthus on Heart. The peculiar slow contraction, sometimes vaguely referred to as "heightened tone," which in the deeply strophanthinized heart precedes the apparent active contractions, being unassociated with any refractory state, according to Tait and Pringle² does not involve physiologic activity in the muscle. They agree with Schmeideberg that the heightened tone is really an increase of elasticity. Roy, dealing specially with the question of elasticity of the heart, could not identify the change produced by digitalis with an increase of elasticity. With Roy's view the authors do not agree. They claim that certain peculiarities in the record of a perfused strophanthus-ventricle find their only explanation in the increase of elasticity produced by the drug.

SULPHUR AND ITS DERIVATIVES.

Intravenous Injections of Colloidal Sulphur in Acute and Chronic Rheumatism. R. Massalongo and S. Vivaldi³ state that the treatment of thirteen patients by this method would show that the intravenous injection causes a short chill, followed by fever which quickly subsides with profuse sweating. Immediate and marked improvement in the patient's general health is seen, with rapid diminution of pain and shortening of the morbid process. They advise its use in young and robust patients without visceral complications, when salicylic treatment has been without avail. The pharmacodynamic action of the sulphur is obscure, but it is analogous to that of other colloidal metals, especially gold. It would seem that this action in rheumatism is by thermic elevation and consequent intense diaphoresis.

(2) Jour. Pharm. and Exp. Therap., July, 1916.

(3) Rif. Med., July 16, 1916.

Intravenous Injections of Colloidal Sulphur in Acute Articular Rheumatism. Loeper and Vahram⁴ have made more than 300 intravenous injections of colloidal sulphur in all kinds of acute and chronic rheumatic affections, whether articular, muscular, infective, or toxic. During recent years colloidal sulphur has often given good results in articular rheumatism when given by mouth in doses of 0.20 cg., or by hypodermic injection in doses of 0.03 to 0.10 cg.; it diminishes pain and swelling and sometimes even bony deformity. For the intravenous method the writers use ampoules of 1 or 2 c.c. containing 0.33 to 0.66 mg. of colloidal sulphur. The injection is made slowly into a vein of the arm by a fine needle with the usual precautions. Apart from the resulting rigor and elevation of temperature, which varies in degree according to the patient, his previous state, and the dose injected, the writers have never seen any bad results. They give particulars of seventeen cases of acute articular rheumatism thus treated; some were mild, others moderately bad, and others very severe. After the febrile reaction which follows the injection the temperature falls, and the pain is soon greatly relieved, and the swelling a little later. In the milder cases, recovery occurs after one or two injections; in the moderate cases after four or five, and in severe ones after ten. Complications may disappear; thus, in one case a pleural effusion cleared up, in another a pulmonary congestion, and in another an albuminuria which had resisted salicylates. The writers begin with an injection of 0.5 c.c., and increase the dose daily up to 2 c.c. in the severer cases; in less severe ones they give a daily dose for five days; and in the mildest one or two successive injections. It is uncertain whether the sulphur acts as a stimulant or an antiseptic. The writers think it acts as a specific for the joint, whatever be the nature of its acute inflammation, rather than as a specific for the disease itself. The early relief of the pain is very marked.

At another meeting of the same society (July 23, 1915), the writers, with Berthomieu, described their experiences with this method of treatment in subacute and chronic rheumatic conditions. Twenty-six patients were treated,

(4) Soc. méd. des Hôp. de Paris, July 26, 1915.

ranging in age from 20 to 60 years. Pains and crackling were common; some patients had periarticular thickenings, and several had bony deformities and calcareous infiltrations. In chronic cases the first two injections have often given a momentary increase of the pains; but the sedative action is as marked as in the acute cases, and the bony thickenings soon become less marked; the crackling is less influenced. Injections are given daily for a period of ten days; sometimes five or six will cure, but the majority need ten or more. In the subacute cases one period of ten days injections is usually enough; the chronic may need two or more such periods in a year. The action is more marked than by the mouth or even hypodermic injection; it is more certain, deeper and more constant. A reaction like that seen in the acute cases may occur, but is much milder, and is specially slight in the chronic cases. The treatment is avoided in patients who are feeble or affected by cardiovascular or renal disease. In the chronic cases, as in the acute, intravenous injections of colloidal sulphur give a temporary leukocytosis, the proportion of blood corpuscles increases progressively, and the arterial pressure rises temporarily. In the subacute and chronic cases the sulphur seems to act, as in the acute cases, as an elective agent on the joint, quite irrespective of the nature of the disease.

Powdered Sulphur in Treatment of Scabies. Unna⁵ reports favorably on Sherwell's treatment of scabies. When not complicated by eczema, powdered sulphur is rubbed into the infected areas. The patient is instructed to keep the sulphur by him, and whenever there is itching, he is at once, either day or night, to rub some of it over the itching parts rather than to scratch them. The results are as certain and less irritating than with the more severe methods.

INTRAMINE.

A Synthetic Preparation of Sulphur. In the course of an extensive research on syphilis in its various aspects, J. E. R. McDonagh⁶ was led to investigate the chemo-

(5) Berlin klin. Wochenschr.
(6) Lancet, Jan. 29, 1916.

therapy of the disease. It was found that the action of arsenic was catalytic, accelerating changes which normally occur spontaneously. The intensity of this catalytic action was proportionate to the degree of the colloid state of the metal, whether it be arsenic, mercury, or other agent. The reaction occurring between the spirochetes, the lipoid-globulin molecules of the serum, and the amino-groups of salvarsan was found to be one of absorption. This was accelerated by the complement which permitted the arsenic to fulfil its rôle of increasing the amount of active oxygen. The drug salvarsan is both organotropic and parasitotropic, the former property being the more important according to the new conception of the reaction, most of the organisms being destroyed indirectly. The arsenic probably becomes transformed into a peroxide and acts as a peroxidase.

For therapeutic effects a reducing process is as essential as an oxidizing one, and chemotherapeutic studies led McDonagh, he states, to the discovery of a new compound—diortho-amino-thiobenzene—which he named “intramine” for convenience. This substance was found to be non-toxic in comparatively large doses and could be injected intramuscularly into man with only slight local pain. The new substance he found to give better results than salvarsan in the primary and generalization stages of syphilis, while in the later stages the opposite was the case. The best results were secured in the early stages when the injection of intramine was preceded by a few doses of some metal as an oxidizing agent. Salvarsan was used with good results to precede the administration of intramine. Metals other than arsenic were used in colloidal combinations and with quite favorable effects, but before their use can become general further study must be made. The experiments and clinical observations serve to prove that it is not the arsenic in salvarsan which is the direct sterilizing agent, but rather the colloidal nature of the compound.

According to Harold Spence,⁷ discussion of the use of intramine, otherwise known as diortho-amino-thiobenzene, in the treatment of syphilis. Intramine was introduced by Mr. J. E. R. McDonagh, and is a synthetic

(7) *Lancet*, April 22, 1916.

preparation of sulphur, and pending McDonagh's report, Spence gives a brief and non-technical summary of his views as therein expressed. Intramine is a mustard-yellow crystalline substance, soluble in alcohol, ether, and acetone, but insoluble in water. For intramuscular administration, the only manner in which it is at present employed, it is suspended in oil, in the proportion of 1 gram in 10 c.c. This readily passes through an ordinary intramuscular needle, and is administered precisely as gray oil is given, the needle-hole being preferably sealed with collodion to prevent leakage, and the possible supervention of a slight dermatitis. Up to 12 grams have been given, but full therapeutic effect is obtained with 1 or 2 grams, repeated in a few days, if required.

Local pain after administration is a variable symptom, some patients complaining of severe and persistent pain, while others, and especially those accustomed to intramuscular injections of mercury, may experience nothing more than slight stiffness. There seems no objection, however, to the addition of a local anesthetic, particularly with female or nervous patients, and Spence prefers quinine and urea hydrochloride, the anesthesia from which lasts several days. Injections are best made at the point midway between the anterior superior spine of the ileum and the upper end of the natal cleft, the needle being directed forward, inward and slightly upward. From 24 to 48 hours after injection a rise of temperature and some malaise may be looked for, but rarely does the thermometer reading pass 103° F. The induration at the site of injection disappears in a few days and with ordinary care there should be no sloughing. The arsenic in salvarsan and similar remedies is not parasitotropic, but acts as a catalyst, multiplying the protective power of the host. This is of a chemico-physical nature, and consists in a process of absorption between the lipoid-globulin molecules of the serum and plasma cells and those of the parasitic. For its consummation the presence of active oxygen is necessary; supplied to the body chiefly through the action of a peroxidase upon a peroxide. Arsenic as a more powerful peroxidase greatly increases the natural defence. Aluminium and iron are even more potent and are non-toxic.

After a time the ability of the host to produce active oxygen directly is lessened: hence it must be produced indirectly, by means of reduction, through the action of a perhydrase. The peroxidases are metallic, the perhydrases non-metallic; and in later stages of syphilis act in a manner analogous to aluminum, iron, and arsenic in early syphilis. Diortho-amino-thiobenzene is an efficient symptomatic remedy, particularly in later secondary syphilis and its complications, and in recurrent and tertiary lesions. It has proved effective in some chronic processes non-syphilitic in character—*e. g.*, lupus vulgaris and chronic leg ulcers.

TAR.

Tar in Chronic Moist Eczema. Thedering⁹ holds the proper application of preparations of tar to be the most satisfactory and prompt means of drying up chronic moist eczema. He prefers a preparation of an anthracite tar in acetone, which should be applied directly to the affected surface and covered by a thin layer of gauze. No water or soap should be used. In twenty-four hours the surface will begin to dry and at the end of three or four days a dry crust will be formed which should be softened by the application of a 2 per cent. salicylic acid ointment. Then, on about the seventh day, the scab can be removed with the aid of a bland soap containing an excess of fat. There is usually found beneath the scab a soft, smooth, and slightly infiltrated area of healthy skin.

TARTAR EMETIC.

Tartar Emetic in Kala-Azar. P. Mackie¹ reports two cases of Leishmanial infection successfully treated by tartar emetic. The first case is interesting in that the disease began in a fissure of the hip and apart from any exposure to insect infection; because of the presence of a subcutaneous nodule due to Leishmania which had no discernible connection with the outside surface, and

(9) Berlin klin. Wochenschr., July 26, 1915.

(1) Brit. Med. Jour., Nov. 20, 1916.

because of the good effect of the antimony in rapidly sterilizing the cutaneous lesion and its slower action on the mucous ulceration.

THEOBROMINE.

Treatment of Chronic Cardiac and Renal Disease With Acid-Salicoyl Derivatives of Theobromine.* Hoffmann² refers to the original introduction into therapeutics of theobromine, which was followed by the mixture of theobromine-sodium and salicylate of soda, known for short as diuretin. Then came theophyllin, an isomer of theobromine, and called for short theocin. All these remedies are successful diuretics, and often one will succeed when another fails. The author, who began to try out these substances as far back as 1889, has tested recently the so-called acidysalicoyl-theobromine, a true synthetic, which seems, he says, to embody all the advantages of its predecessors. He has treated thirty or more patients with nephritis, cardiac myodegeneration, mitral lesions and coronary sclerosis, with the new synthetic which unburdens the heart by its action on the kidneys even after digitalis preparations have shown their inadequacy to relieve the strain on the heart. The remedy was tested especially in cases which did not respond to digitalis and the older diuretics. In but five cases did failure attend the use of the remedy, which as a rule behaves as a synergist to the digitalis group. Nevertheless it is often able to do its work alone. It lowers a high blood-pressure, which perhaps explains its power in true angina pectoris. Perhaps the drug should be regarded, Hoffmann says, as a potentized theobromine.

THIOSINAMINE.

Treatment of Uterine Fibromata With Thiosinamine. Artault³ recommends the use of thiosinamine for these growths. All his patients have been relieved quickly, first of the pain and then of the metrorrhagia. Many

*It must be borne in mind that at present it is impossible to obtain many of the German synthetic remedies.

(2) Münch. med. Wochenschr., Aug. 17, 1915.

(3) Bull. Soc. Therap., April 14, 1915.

felt so much better that they considered themselves cured, and stopped the treatment, although the tumor was still present. To obtain a good result, the treatment must be persevered with for weeks, or even months, for the effect upon the blood requires a month or two to bring about. The tumor itself gets gradually smaller; during the first month of treatment, there is an appreciable reduction in size, but after this it is more gradual. Some have disappeared altogether in six or eight months, while others have become much smaller, but have apparently reached a stationary stage, in which all the symptoms have gone.

The solution used contains 10 per cent. of thiosinamine, with a little antipyrine, alcohol, and glycerine to make it more soluble; 1 c.c. of this is injected at first, then 2, 3 or 4 c.c. two or three times a week, depending on how the patients bear it. In addition, 20 drops are taken in a draught before each meal. If this solution causes too much pain, it must be replaced by one containing equal parts of thiosinamine and antipyrine. To one patient who was unable to go on with the treatment, Artault gave injections of colloidal sulphur with good results.

TRICHLORACETYL-DIPHENOL-DI-IODIDE.

This complex substance⁴ was introduced by T. A. Wallace twenty years ago as an internal and local antiseptic. It is soluble in water to the extent of 7 per cent. and is not very irritant, so that it can be injected intramuscularly in doses up to 3 c.c. without much local pain. The drug has given favorable results in many instances of systemic and extensive local infection, such as puerperal sepsis; when applied locally in a solution of one dram to the pint it proves an efficient dressing in all forms of infection. In erysipelas rapid recoveries followed the local use of the drug combined with injections made into the affected region. Buboes secondary to chancroids were treated with the best results; it is also a valuable means for skin sterilization prior to surgical operation.

(4) Long Island Med. Jour., April, 1916.

TRICHLORBUTYL-MALONIC-ESTER.

Action of Trichlorbutyl-Malonic-Ester on Cough. Pharmacologic experiments have shown that this substance is harmless in large doses when given to rabbits, that it produces a general diminution in reflex excitability and that it does not depress the blood-pressure. Ernst Meyer⁵ undertook the therapeutic use of the drug in marked and persistent cough. He gave an ammonium salt of the drug on account of its greater solubility and mild taste. From 0.5 to 0.6 gram was given daily, the single doses being 0.1 or 0.2 gram. In some instances twice the larger dose was given *per diem*. In most cases there was prompt alleviation of the cough, although the larger doses were sometimes needed in obstinate cases. A special indication was found in pulmonary tuberculosis with hemoptysis in small amounts; the drug almost at once checked the loss of blood, even when all other measures had failed. The mechanism of this latter action is not understood.

UREA.

Urea, a Bactericide in the Treatment of Wounds. Symmers⁶ writes that he discovered some years ago that urea destroyed microorganisms in culture media, and that when added to albuminous material such as tuberculous sputum it inhibits the growth of practically all microorganisms. It is also a bactericide when in the presence of blood. Symmers therefore recommends urea in the treatment of wounds. It is non-toxic, as has been shown through its being sprinkled pure on Thiersch skin grafts, or when 1½ drams in powder was placed between the fragments of a fracture which had been plated and the wound closed.

Excellent results have been obtained during the present war in Europe by the use of urea as a disinfectant for wounds, the one and only objection being that its application causes some pain. It is used as a dusting powder. Processes of repair are not delayed.

(5) Berlin klin. Wochenschr., Aug. 16, 1915.

(6) Lancet, Dec. 4, 1915.

VALAMIN.

Valamin in Cardiac Disease. The preparation used by Lewinsohn⁷ is the valerian ester of amylene hydrate and it has a powerful hypnotic and sedative action. It has been used with benefit in cardiac disease. The dose usually employed is two ampoules; at times, a third is found to be necessary.

(7) Münch. med. Wochenschr., Jan. 26, 1915.

PART II.

EXTRACTS OF ANIMAL ORGANS, BACTERIAL PREPARATIONS, SERUMS AND VACCINES.

ORGAN EXTRACTS.

Organotherapy. As fundamental principles of this form of therapy, Frank R. Starkey¹ states that the preparations used must be made from animals which have not been castrated, and that the glandular substances must not be given singly, for in Nature their supply is grouped, the pituitary, thyroid, parathyroid, and sexual glands all being interdependent. The suprarenal gland, he says, need not be used, because its action is ephemeral and because its place is taken by the pituitary. Lastly, the glandular preparations should never be given by mouth, since they are materially altered by digestive processes. Intramuscular administration, he declares, is the only suitable method.

Combining Organotherapeutic Extracts. "A considerable and increasing interest is now being manifested in the administration of mixed glandular extract or pluriglandular therapy, as it has been called, and, as usual, the skeptics condemn it without trial and their comment is crystallized into a statement recently heard following a medical gathering: 'It is nothing more nor less than a reversion to the old-fashioned shot-gun mixtures of our grandfathers.'

"Now, nothing could be further from the truth, for while it is admitted that pluriglandular therapy involves the use of several preparations simultaneously, it is not in the least degree similar to 'shot-gun' medication, for those who express their skepticism overlook the fact that the blood plasma contains an extremely complex mixture

(1) Northwest Med., Jan. 1, 1916.
(2) Practitioner, February, 1915.

of substances, including the numerous hormones from the glands of internal secretion. The blood is the common highway for all these chemical messengers as well as the scores of other specialized proteins concerned in the production of immunity. While this is in mind it may be recalled that not many years ago 'mixed vaccines' were condemned as unscientific and the same epithet—'shot-gun mixtures'—was applied to them; yet to-day in the highest circles here and abroad, 'tetravaccines' and 'pentavaccines'—nothing if not combinations of four or five different organisms, given with the expectation of producing simultaneously four or five sets of immunizing substances in the blood—are recommended as rational and effective and their application has been tested in hundreds of thousands of cases!

"To return to our subject. If it were possible to separate from a quantity of blood serum all the hormones in solution, we would find them in proportions suited to the functional condition of the individual, and in harmony with one another. The organs influenced by them have the faculty of picking them up from the plasma and being stimulated or otherwise as their need may be.

"If, then, there is a deficiency in one or more of these substances, there follows a pluriglandular dyscrasia—never a monoglandular disorder, which obviously means that pluriglandular therapy is more definitely indicated than is the administration of a single glandular extract.

"From a clinical standpoint there is plenty of proof that this 'shot-gun hormone therapy' is effective, and, too, that it is more effective than the use of single extracts. In fact, failures with the application of organotherapy, even in the best known disorders where one extract is usually given as thyroid in myxedema, pituitary in Froehlich's syndrome or corpus luteum in climacteric disorders, are often due to the fact that more than one gland is involved. Many times cretins advance much more rapidly when to their necessary modicum of thyroid is added some other deficient, synergistic extract. Quite recently Blair Bell illustrated this very nicely in the following statement:

"'Ovarian insufficiency we can ignore from a diag-

nostic point of view; and this is convenient as it is most difficult to demonstrate. Such a proceeding is scientifically justified by the knowledge that both thyroid and pituitary insufficiency induce ovarian insufficiency. When we have decided whether it be the thyroid or pituitary which is at fault, we should treat the case by the administration of pituitary substances (whole gland gr. v, *ter diem*) or thyroid extract (dried gland, gr. i or more every night) as the case may be, together with ovarian extract (gr. x, *ter diem*). It is, further, my opinion that ovarian extract is of little use when given alone, but that good results may be expected when it is combined with thyroid or pituitary extract, according to which is required.'

"Many other quotations might be made and evidence adduced to show that combining organotherapeutic extracts is both scientific and useful. Surely this derided 'shot-gun hormone therapy' is much more reasonable than the old-fashioned 'black draught,' which is the typical example of the polypharmacy of our grandfathers; and the results which follow its applications—as well as those which are not obtained when pluriglandular therapy is overlooked or ignored—are encouraging and convincing, for this is a natural method of treatment and the combination of the various stimuli administered by us favor the production of increased quantities of the internal secretory principles which, obviously, must be reduced when the other activities of the body are so generally below *par*."

Effect of Gland Extracts on Vasomotor Irritability. Various pancreas and salivary gland preparations administered by A. F. Beifeld, H. Wheelon, and C. R. Lovellette³ caused a vascular depression. This was associated with decreased reaction to epinephine, but with an augmented reaction to nicotine. Such extracts cause, therefore, an augmented irritability of the vasoconstrictor centers.

Brain Lipoid (Thromboplastin) as a Hemostatic. A lipid material was readily isolated from ox brain by Arthur D. Hirschfelder⁴ and determined by animal ex-

(3) Amer. Jour. Physiol., April, 1916.

(4) Berlin. klin. Wochenschr., Sept. 13, 1915.

periment to have a pronounced hemostatic action when brought into direct contact with bleeding surfaces. This was tested clinically in several different types of surgical hemorrhage and found to produce prompt and firm clotting with checking of the hemorrhage. The substance was obtained in the form of a yellow powder which could be applied directly to the bleeding surface or dusted on a pad of gauze and applied with slight pressure for a few moments. The preparation is sterile or can be rendered antiseptic, if desired, by the addition of trieresol in the proportion of 0.1 per cent. in the dried product. The greatest advantages of the preparation are that it is easily prepared and is cheap.

J. J. Cronin⁵ gives an account of the method employed for the removal of tonsils and adenoids at the five clinics under the supervision of the Bureau of Child Hygiene, Divisions of Children's Clinics, New York City. The clinics have been carried on since March, 1912. For about six months horse serum was employed to prevent hemorrhage, with fair success. In October, 1914, Cronin with T. Joseph Barry devised a combined operation, which, while simpler than the former method of procedure, did not overcome the capillary oozing from the nasopharynx. About this time Cronin's attention was called to an article by Alfred F. Hess with reference to thromboplastin as a hemostatic, and he immediately began the use of thromboplastin after the removal of the tonsils and adenoids, by applying it to the denuded surfaces. The results were striking. The patients showed only a little bloody saliva after being put to bed, healing was expedited, and many patients were entirely well at the end of four days. Thromboplastin was introduced into all the Department of Health nose and throat clinics with remarkably good results.

The technique of the preparation of thromboplastin is as follows: Fresh ox brains are obtained from the slaughter-house, stripped of their membranes, washed in running water, and weighed. They are then passed through a meat chopping machine three times and an equal amount of normal salt solution is added. This suspension is allowed to remain in the refrigerator for

(5) Jour. Amer. Med. Ass'n., Feb. 19, 1916.

forty-eight hours, then it is twice passed through cheese-cloth. This extract is diluted with one-half its quantity of salt solution. Tricresol is then added in proper proportion so that the finished preparation contains 6.3 per cent. The fluid remains sterile and maintains its hemostatic potency for months.

Therapeutic Value of Spleen Extract. H. M. Harrower⁶ advocates the use of spleen organotherapy in anemia, malnutrition, leucopenia, malaria, typhoid, and tuberculosis. Its action is the production of leukocytosis.

Pancreatin in Exophthalmic Goiter. In a note by Leviton⁷ reference is made to some clinical experiences which show the intimacy of the relation between the ductless glands and the unexpected clinical results that sometimes are noticed during the treatment of disorders of the internal secretory organs.

Leviton gave from 15 to 20 grains of pancreatin by rectal administration two or three times a day in a series of cases of diabetes mellitus. In two of these there was a complete cessation of the manifestations of an exophthalmic goiter which was associated with the diabetes. Experiences of this character, while not necessarily advancing new and unquestioned methods of treatment, are convincing evidence of the importance of the hormone balance and its disturbances, and indicate that pancreatic disease may complicate thyroid disease and *vice versa*, and that therapeutic advantage may be taken of these possibilities.

Treatment of Paralysis Agitans With Parathyroid Gland. The preparation used by Berkeley⁸ is an acetic extract of the fresh bullock's glands, made by treating the ground or triturated glands with cold distilled water, filtering, and then precipitating with a very minute amount of acetic acid. It is absolutely without local effects of a disagreeable nature. The hypodermic solution, in doses of 15 minims, does not even redden the skin, if it be injected with reasonable care. Parathyroid gland is not a "cure" for paralysis agitans, but from 60 to 70 per cent. of the sufferers from this disease who

(6) Med. Record, June 3, 1916.

(7) Jour. Amer. Med. Ass'n., Jan. 1, 1916.

(8) Med. Record, July 15, 1916.

have given the remedy a fair trial for from three to six months have been greatly benefited, and in such patients the progress of the disease has been arrested, or very materially retarded.

Berkeley is of the opinion that paralysis agitans is caused by a deficiency of the parathyroid glands, and that further and more diligent study of the complicated chemical processes involved will make it possible, ultimately, to cure paralysis agitans with parathyroid in just the same way in which cretinism is cured with thyroid.

Intramuscular Use of Corpus Luteum Extract in the Surgical Menopause. J. C. Hirst⁹ states that in the surgical menopause his results from the oral administration of corpus luteum extract have been disappointing. The large doses necessary for beneficial effects are often productive of nausea. He has lately tried, however, intramuscular administration of the drug, with gratifying results. In the first case reported, after discontinuance of oral administration on account of nausea, with only slight amelioration, intramuscular injections equivalent to 15 grains of fresh gland were given, at first daily for eighteen doses, then on alternate days for four weeks, and later biweekly for a few weeks. The flashes of heat and other symptoms began to improve rapidly after about six doses, without nausea, and since the end of the treatment the patient has remained practically free of symptoms. Similar results were obtained in five other cases of supravaginal hysterectomy. Hirst believes that the doses he used might be greatly increased with benefit and without harmful effect. Experience will probably show the effect of the drug to be cumulative and that the interval between doses can be gradually lengthened and the drug then discontinued without a return to the previous symptoms.

PITUITARY EXTRACTS.

Pituitary Extract in Diabetes Insipidus. According to G. Maranon's¹ statement the hypophyseal origin of dia-

(9) Amer. Jour. Obstet., April, 1916.

(1) Rev. Clín. de Madrid, Dec. 15, 1915.

betes insipidus is now established, and the disease should be treated with pituitary extract which, he declares, gives brilliant results. Other associated ductless glands may be affected, and when such is the case their extract should also be administered.

The Pituitary Body and Renal Function. In one case of diabetes insipidus studied by Motzfeldt² feeding the patient with the posterior lobe of the pituitary body checked the diuresis, while administration of the anterior lobe had no such effect. In a second case, four posterior lobes of the pituitary body taken in the evening proved to be sufficient to diminish the output of urine to such an extent that the patient could sleep comfortably every night. In a third case, the diuresis went down from 6,000 to 1,500 c.c., and the specific gravity increased from 1,003 to 1,007 on subcutaneous administration of pituitary extract.

Warning in Use of Pituitary Extract. Dr. S. W. Bandler³ sounds a note of warning regarding the use of pituitary extract, but believes that nothing has been introduced into obstetrics which approaches it in value if it is used in the proper manner and in proper doses.

This agent increases the contractile power of the uterus; it is evanescent in its effect, the influence lasting in proper doses about half an hour. He has seldom used more than a third of an ampoule at the first hypodermic injection; occasionally, when necessity demands, he has given one-half an ampoule. This is one of the important factors to be borne in mind; otherwise, it causes an extremely powerful contraction of the uterus which may do harm even if all the conditions are normal, but which is certainly dangerous if the conditions are abnormal. In a slow, painful, non-progressive first stage of labor, if the head is moulded and fixed and through the brim, pituitary extract is a splendid help.

Pituitary Extract in Uterine Bleeding; Preliminary Report of Cases. Adolph⁴ states that the hypodermic use of pituitary extract has proved a very valuable procedure, and has been uniformly successful. In every

(2) Boston Med. and Surg., Jour., May 4, 1916.

(3) New York Med. Jour., Oct. 30, 1915.

(4) Med. Record, Feb. 6, 1915.

case of menorrhagia the duration and amount of the menstrual flow were diminished. In cases of metrorrhagia the same diminution was noted, and the intervals between bleedings were lengthened. In cases of continued bleeding after operation, the bleeding ceased and the normal menstrual cycle was restored. In one case in which the extract was used for threatened abortion the bleeding stopped, but more extensive experience will be necessary before this treatment can be regarded as advisable in all cases of this character.

Pituitary Extract in Obstetrics. The most marked benefit from the drug was obtained by W. D. Macfarlane⁵ in the second stage of labor. Observation showed, however, that when the uterus is exhausted it must be rested before pituitary extract is given. Since the degree of action varies in different individuals, it is best to begin with a small dose, and repeat it frequently, if desired. The marked and prolonged uterine contractions excited by the drug scarcely admit of a post-partum hemorrhage—unless a lacerated cervix is at fault. There occurs, however, more bleeding than normal after placental expulsion if pituitary extract has been used. This can be controlled by administering a small dose of the drug immediately after the placenta has appeared. Contraindications to the drug especially referred to by Macfarlane are anemia and obesity, in the presence of which, sudden blanching and faintness may occur, chronic renal disease and arteriosclerosis, marked pelvic contraction, and a rigid cervix. Uterine contractions, stimulated by pituitary extract, becomes less severe but not less frequent when chlorform is administered in the latter part of the second stage.

According to H. R. Cogburn's experience, pituitary extract should be used to assist and strengthen natural labor pains; it does not induce them. When the pains are good, but the intervals between them are so long that hours of waiting are required, the patient becomes worn out, and the child is born after much delay, pituitrin will greatly shorten the suffering and anxiety of the mother, to say nothing of the probable benefit to the

(5) Glasgow Med. Jour., September, 1915.

(6) New Orleans Med. and Surg. Jour., May, 1916.

child. He never gives the drug until the cervix is almost or completely dilated, but when the pains in the second stage of labor grow weak, the fetus at a standstill, and the mother exhausted after a long, hard first stage, and the passage is clear, he feels free to use it. Alcohol renders pituitrin inert, so if the hypodermic syringe and needle have been sterilized with alcohol, they should be washed out with sterile water, or boiled, before they are used to inject the drug. An initial dose is 1 c.c. after the os is well dilated; if satisfactory results are not obtained the dose may be repeated in from one half to one hour.

Action of Pituitary Extracts on Isolated Intestine.

It is stated by Shamoff⁷ that there exists in the posterior lobe of the pituitary body some substance which has an action on the isolated intestinal loop resembling the action of epinephrine, a substance, moreover, which may be other than that which raises blood-pressure and causes diuresis. The substance is not constant in the extractives prepared in the usual ways and may be inconstant in the fresh glands from which these substances are prepared. Its presence or absence in the extracts may depend on the method of preparation.

The conclusion drawn by Shamoff is that certain posterior lobe preparations are capable of producing relaxation of the isolated intestinal loop and of inhibiting its rhythmic contractions, resembling in this respect the extracts of the suprarenal medulla.

Citing Shamoff's recent observation that pituitary extracts caused a marked depression of isolated portions of rabbit's intestine in many cases, R. G. Hoskins⁸ records his own observations with various samples of the extract, including commercial specimens, on the intestine of the dog. The drug caused depression of tonus and peristalsis in five out of six cases, when given intravenously to the intact animal. Since the extract of the pituitary is often used as a peristaltic stimulant, this opposite action is of importance. It may be in some way related to recent changes in the mode of preparing the extracts.

(7) Amer. Jour. Physiol., January, 1916.

(8) Jour. Amer. Med. Ass'n., March 4, 1916.

Possibly the failure at times to secure diuretic effects from the drug may have a similar explanation.

Action of Hypophysis Extracts on Graves' Disease and Hyperthyroidism. According to Pal⁹ hypophysis extracts have no effect upon the normal thyroid gland and certain strumas. But when given for the thyreotoxicoses, the toxic state improves. Even if the gland is increasing in size improvement is noted. This increase in size is evidently due to distention of the follicles, so that the toxic secretions of the thyroid must have a separate origin and be antagonistic to the active principle of the follicular substance. The author has used hypophysis extract in sixteen cases of Graves' disease and hyperthyroidism. The reaction was not the same in all cases. The remedy was first given internally. Although one surprising result was thereby obtained he proceeded to use the hypodermic method. Finally his chief interest centered in the cachectic cases with low blood-pressure, and showing every token of deep intoxication. In nine such cases in which an operation could not be performed, he obtained a gain of weight in seven. There was also improvement in restlessness, tremor, and outbreaks of perspiration. The tachycardia showed a gradual improvement, but returned as soon as the medication was suspended. In three of these severe cases was seen especially the paradoxical symptoms already mentioned—swelling of the thyroid; and in a fourth case of apparent atrophy of the thyroid with profound thyreotoxicosis, the latter was not only overcome but the patient acquired a new thyroid and there is no doubt that his life was saved by the extract. Animal experiment has shown that thyroid and pituitary extract are in part antagonists—for example in their action on the circulation; and the author assumes that the latter also inhibits the secretion of the former. At the same time some antagonistic substance normally held in check by the thyreotoxic substance appears to be generated in excess and to produce swelling of the gland.

The Pars Intermedia of the Hypophysis. This contribution¹ has to do with the action of the pars intermedia

(9) Deutsch. med. Wochenschr., Dec. 23, 1915.

(1) Amer. Jour. Dis. Child., November, 1915.

of the pituitary gland. These particular activities of the gland, from a therapeutic standpoint, have become apparent through a study of an abnormal child carried on for the past two and a half years by Haynes, and previously by several physicians connected with the dispensary of the Babies' Hospital, including Drs. Kerley and Van Ingen. It seems evident in this case, that, assuming a deficiency of thyroid as evidenced by the condition when first coming for treatment, there was also an affection of the pituitary; that this affection of the pituitary partook of the nature of a deficiency of the pars intermedia, and that the administration of pars intermedia improved the condition in unexpected ways.

It was interesting in following the unfolding of this case to see:

1. Symptoms which might rationally have been considered to be due to hypothyroidism clear up with the administration of pars intermedia.

2. The remarkable effect which the administration of this lobe had on the smoothness, texture, and color of the skin and its warmth.

3. The striking changes in contour of hands, ankles, hips, shoulders, thighs, etc., changes which could be made to come or recede with giving or taking away of the gland.

Hypophyseal Extract in Bronchial Asthma. E. Riese³ suggests that the belief that bronchial asthma is due to bronchial spasm is incorrect. He contends that the affection is due to the opposite condition—to a state of paresis of the bronchial musculature with loss of tone and diminution in the normal elasticity and contractility of the bronchi. He supports his contention with plausible arguments, among which is the fact that epinephrine, which stimulates the sympathetic nervous system and produces contraction of smooth muscle in the uterus, etc., produces beneficial effects in bronchial asthma. It is well known that hypophyseal extract acts in much the same way as epinephrine and on the same structures, but its action is more prolonged and it tends, in addition, to direct stimulation, to increase the tone of involuntary muscle. The author has used this latter agent

(3) Berlin. klin. Wochenschr., July 19, 1915.

in a large number of cases of bronchial asthma with the most satisfactory results. The remedy not only proved capable of relieving the acute attacks, in which its action was somewhat slower than that of epinephrine, but also tended to produce a more or less permanent cure of the condition when its administration was repeated at intervals over a considerable period of time. The latter, more permanent effect was probably referable to the power of the drug to increase the tone of the muscles and to an improvement in their contractility through continued stimulation analagous to the strengthening of voluntary muscles by athletic training.

SUPRARENAL EXTRACTS.*

Epinephrine in Local Treatment of Wounds. Wildt⁴ relates that since 1910 he has been using a 1 to 100,000 solution of epinephrine applied directly to granulating surfaces, and states that this keeps the granulations soft and velvety, as they consist mostly of newly formed blood-vessels. He has continued this method of treating wounds during the war, and has applied it in the last six months, to 421 wounded soldiers. There were never any injurious by-effects and the wounds made a better showing than those treated by hot air, scarlet-red, ultra-violet rays, etc.

Epinephrine for the Wounded. Sergeant⁵ has been preaching since 1898 the importance of a deficit in suprarenal functioning as a factor in various syndromes. His experience at a military base hospital has confirmed the frequency of acute disturbance in one or both suprarenals from toxic-infectious influences or hemorrhage—also of sudden aggravation of a previously latent debility of the suprarenals. Under ordinary conditions they are able to accomplish their task, but under sudden stress they break down. Both conditions are encountered almost daily in wounded and sick soldiers from the front.

(*) It must be borne in mind that each manufacturer has his own trade-mark name for his particular extract of the suprarenal gland, and that writers are frequently careless in designating the particular extract which they have used. Laboratory workers as a rule use the term "epinephrine," no matter what manufacturer's preparation they may have used.

(4) Münch. med. Wochenschr., Nov. 23, 1915.

(5) Bull. de l'acad. de méd., Sept. 7, 1915.

Collapse was particularly frequent in typhoid among soldiers who had been under special physical stress. In many of these cases large subcutaneous doses of suprarenal extract tided the men past this dangerous phase. Similar experiences have been noted in typhus, according to the account of a French medical officer returned from captivity in Germany. In several cases Sergeant witnessed the subsidence of the algid phase in choleric-form diarrhea under the influence of injections of suprarenal extract. Naame of Tunis has reported success in cholera from the use of epinephrine as an adjuvant to serotherapy. Two of Sergeant's patients had been brought in completely collapsed; the asthenia was absolute. One had long presented symptoms of abortive Addison's disease; the other had recurring attacks of asthenia following typhoid years before. Both presented the typical "suprarenal white line," hypotension, hypothermia and tendency to collapse, but both rallied promptly under suprarenal treatment.

The wounded are in such a state of shock, as a rule, that the extra shock of general anesthesia is liable to extinguish the flickering flame of life, unless the surgeon appreciates the important aid to be obtained from epinephrine. Sergeant urges that the ambulances, the first-aid stations and the trains carrying the wounded should be supplied with suprarenal extract to use in preventing or combating suprarenal insufficiency. Even if the patient's suprarenal glands are working properly, this treatment is a most excellent tonic for the cardiovascular system. In the collapse of typhoid he warns that the amount must be at least 2 mg. of the 1 to 1,000 solution, fractioned into four doses, and supplemented by 1 or 2 mg. given by the mouth. This combines rapid and intense absorption with slow and continuous absorption. He is convinced that many of his patients owe their lives to this technique.

Effect of Epinephrine on Splanchnic and Peripheral Arteries. Hartman⁶ found that dilute epinephrine slowly injected caused a fall in general blood-pressure in forty-eight out of fifty-three animals tried. Three of the animals in which a fall did not occur were in poor

(6) Amer. Jour. Physiol., October, 1915.

physical condition and one was just recovering from the effects of alcohol. Dilute epinephrine caused dilatation of the peripheral arteries even after extremely low pressure had been produced by hemorrhage. The same dose of epinephrine caused constriction of the splanchnic arteries. When the blood-pressure was lowered by depressor stimulation, the same dose of epinephrine caused a fall, a rise and fall or a pure rise, depending somewhat on the height of the pressure. The average latent period for the peripheral fall in the blood-pressure (from doses of 0.2 c.c. epinephrine, 1 to 10,000) was 15.7 seconds; the latent period for the splanchnic rise was 18.6 seconds. The duration of the splanchnic rise was 37.8 seconds, while the duration of the peripheral fall was fifty-nine seconds. The threshold for the change of a fall to a rise in the peripheral arteries, when epinephrine was injected (in three animals only) over a period of from ten to twenty seconds, was between 0.1 and 0.3 c.c. of a 1 to 10,000 solution. Large doses of ergotoxin phosphate inhibit the splanchnic response to dilute epinephrine. The existence of sympathetic vasodilator nerves in the peripheral arteries and their absence in the splanchnic arteries would account for the opposed action of like doses of dilute epinephrine on the peripheral and splanchnic arteries.

Epinephrine in Heart-Block. Heitz⁷ cites Routier's classification of auricle-ventricle dissociation as simple heart-block, complete dissociation, and partial dissociation. The trouble may be in conduction of the impulse or in the generation of the impulse. Recent experimental research has demonstrated that there is certainly some connection between the cardiac fibers of the sympathetic and the conduction of the impulse, but that the latter is almost entirely, but not quite, independent of these fibers. The connection is enough, however, to justify the administration of epinephrine when the conduction is being interfered with, as epinephrine has such a marked action on the sympathetic nerve. Routier arrested conduction by nipping with forceps the bundle of His in dogs. The auricle beat was 140, the ventricle 55, in one typical experiment of the kind. Then an injection of

(7) Arch. des mal. de coeur., February, 1916.

epinephrine was made; in twenty seconds the auricle beat became 115 and the ventricle beat also 115, showing that the heart block had been overcome. As the effect of the epinephrine passed off, the auricle beat increased to 120 while the ventricle beat dropped to 42. These results of epinephrine treatment occur even when the first two thoracic ganglia have been removed, confirming the assumption that epinephrine acts on the terminal nervous apparatus in the heart. It accelerates the beat by its action on the nerve terminals in the coronary sympathetic plexus, but it arrests the heart-block through the sympathetic fibers in the bundle of His, stimulating the bundle until it is able to resume its task of conduction thus rendering possible the passage of the wave of contraction so long as the bundle of His is not entirely destroyed. A larger place must be yielded to the nerve factor in our estimation of dissociation of the auricular and ventricular beat. The nerve factor may be within or without the heart, according as the disturbance in conduction is the result of hypertonicity of the vagus or of functional insufficiency of the sympathetic. Epinephrine has thus been demonstrated, Heitz asserts, to have a regular place in treatment of heart-block.

Effect of Epinephrine on Medullary Centers. Summing up the results of his experiments, E. D. Brown⁸ says that they tend to show that when epinephrine is perfused through the cerebral circulation, it may in a certain percentage of cases cause a slowing of the heart and that this slowing is at least in part due to a direct stimulation of the vagus center. There is certain evidence which strongly suggests the probability that the drug also stimulates the vasomotor center. The effect on the respiratory center is very variable. There is evidence of both stimulation and depression and neither of these effects appear to be governed by the size of the dose of the drug.

The Adrenaline Reaction and Its Bearing on Treatment in Gastric Crises of Tabes. Intramuscular injection of 0.5 c.c. of 1 to 1,000 adrenaline solution was found by Bayard Holmes,⁹ to cause a paradoxical drop of from

(8) Jour. Pharm. and Exp. Therap., April, 1916.

(9) Lancet-Clinic, Oct. 30, 1915.

30 to 40 mm. Hg. in the blood-pressure in cases of tabetic gastric crisis. Complete relief from the pain was simultaneously experienced. The pressure rose again and the pain returned in from half an hour to fifty minutes. A similar paradoxical lowering of pressure had already been observed in dementia praecox and by Newberger in cerebral syphilis and menstruating women. The facts that an animal in which betainaminazolyethylamine—a toxic amine contained in ergot—has been injected shows the same paradoxical action of adrenaline when the latter is subsequently introduced, and that the toxic symptoms due to the amine are removed when the adrenaline is injected, suggested to Holmes that betainaminazolyethylamine might be present in the system as a result of intra-intestinal putrefaction in tabetic gastric crises, and that adrenaline might bring relief in the same way as it does in the animal experiment just referred to. Examination of the stools in such cases did demonstrate the presence of a relatively large quantity of the amine. Between attacks, on the other hand, none of the amine was found. The further clinical observation that amyl nitrite and chloral hydrate relieve the pain of the gastric crisis is held also to support the author's theory, as these drugs respectively, split up and bind the amine, in each instance thereby destroying its toxicity. The paradoxical adrenaline reaction is to be considered useful as a means of diagnosis in cases in which a surgical operation for the relief of pain, presumably tabetic, is contemplated.

Spotted Fever Treated With Adrenal Secretion. Three cases of Rocky Mountain spotted fever were treated by M. H. Smith¹ with adrenal solution in doses of from 8 to 16 minims by mouth every four hours. The febrile duration of the disease was shortened and the eruption did not become so dark as usual.

Contra-indications to Subcutaneous Injections of Epinephrine. Fridericia¹ refers to the medical use of epinephrine. He says that it is used in Denmark quite extensively in treatment of asthma. The asthma patients admitted to the Rigshospital in recent years had all been given subcutaneous injections of epinephrine at

(1) Med. Record, Oct. 2, 1915.

(1) Ugeskr. f. Læger, Dec. 9, 1915.

some time or other. The transient pallor, chilliness and palpitations sometimes observed after the injection have always been regarded as negligible by-effects in comparison to the relief obtained from the epinephrine. M. Donaldson seems to be the only one who regards these by-effects as so serious that he has given up the use of epinephrine. Fridericia has compiled from the literature five deaths following injection of epinephrine. In one of these a large dose (0.6 gm.) had been injected into a vein in a much debilitated patient with infarction of the lungs, granular nephritis and arteriosclerosis. In all the others the epinephrine had been injected into the muscle of the uterine cervix while the patients were under the influence of chloroform. He has also found two deaths on record after subcutaneous injection of epinephrine, but these were in infants, only $3\frac{1}{2}$ months old. Kauert has reported a case of briefly transient pulmonary edema in a patient with pneumonia given an intravenous injection of epinephrine, and arrhythmia with dyspnea in a patient with an aortic valvular defect with failing compensation. Experimental animals can stand from ten to fifty times relatively larger doses by subcutaneous injection. A number of clinicians have reported unfavorable experiences with subcutaneous injection of epinephrine in cases of heart or valvular defects. Some warn expressly against it in case of heart disease or nephritis with high blood-pressure. On the other hand, testimony is constantly accumulating as to the value of epinephrine in sudden heart weakness in the course of acute infectious diseases.

These and other data cited confirm the danger of administering epinephrine in case of organic heart or valvular disease, and this conclusion is re-enforced by two cases from Fridericia's own experience. The epinephrine had been given to relieve asthma in both, but the asthma was not, as supposed, ordinary bronchial asthma, but was of cardiac origin. The subcutaneous injection of 0.4 c.c. of 1 to 1,000 epinephrine in the first case was followed by collapse and angina pectoris and the man, aged 62, died the second day, after a period of Cheyne-Stokes respiration. The second patient was a woman of 49 with hypertrophy and dilatation of the left ventricle. She had suf-

ferred from dyspnea at times during the last eighteen months and in one severe attack she was given a subcutaneous injection of 0.4 c.c. of epinephrine. Dyspnea became much aggravated at once and the woman vomited and felt much depressed. Under morphine and camphor she felt better, but died three months later having presented angina pectoris and Cheyne-Stokes breathing during the interim. In both these cases the interne summoned in haste to the patients failed to distinguish that the asthma was of the cardiac rather than the ordinary bronchial type. In fact, the diagnosis that had accompanied the patient to the hospital was "bronchial asthma."

Signs of a valvular defect or hypertrophy of the left heart generally exclude bronchial asthma. With cardiac asthma there is no expectoration or merely reddish foamy masses. Fine moist râles may be heard with cardiac asthma and with asthma of the bronchial type there are rhonchi. Bronchial asthma usually occurs only at certain seasons of the year. The sputum also shows the characteristic spirals, etc., and the blood eosinophilia. Opinions are conflicting as to whether epinephrine should be given when true bronchial asthma is accompanied with a weak heart. Fridericia regards any cardiovascular insufficiency as contra-indicating it.

SÉRUMS, VACCINES AND BACTERIAL PRODUCTS.

Treatment of Arthritis by Intravenous Injection of Foreign Protein. J. L. Miller and F. B. Lusk¹⁰ cite evidence confirmatory of that already recorded, making it quite apparent that the sudden termination of certain diseases is not due to the specific character of the vaccine used but probably to the action of a foreign protein. With this fact in mind it was decided to apply this method of treatment to acute, subacute, and chronic arthritis. Only those cases were selected for study in which the disease was of a persistent type. They gave a 4 per cent. proteose solution in doses of 2 c.c. The pa-

(10) Jour. Amer. Med. Ass'n., June 3, 1916.

tient reacted by a chill, rise in temperature, and moderate leukocytosis. The day following the injection there was a moderate but definite improvement in the joint symptoms. As the supply of protein was limited a typhoid vaccine was substituted for the proteose. The reaction was the same as when the vaccine was given to a typhoid patient, except that the leukocytosis was much more marked. In three of ten cases of acute articular rheumatism, immediately following a single intravenous injection of 150,000,000 the fever terminated by crisis, the joint tenderness began to disappear, and within from twelve to twenty-four hours the joints were apparently normal. The seven remaining patients were much benefited following a single injection, but the results were either not permanent, or soreness still remained in some of the affected joints. Three or four injections, however, sufficed to relieve all symptoms. Results quite as satisfactory were obtained in six cases of subacute arthritis of from three to nine months duration. Results were even more striking in cases of chronic gonorrheal arthritis of from two months to three years' duration. The authors state that they believe the same process is active here that is responsible for the termination by crisis in typhoid, following the intravenous injection of vaccine. That the febrile reaction following injection is not solely due to the foreign protein injected is suggested by the much milder reactions in patients with low degrees of infection. Whether or not this method of treatment is of value as a therapeutic agent it will at least give further evidence of the non-specificity of vaccines. It does not, however, involve the specificity of vaccines for preventive purposes.

Xerosis Treated With Autovaccine. Xerosis, xerophthalmos or keratosis is one of the most serious ocular affections; it consists clinically of desiccation of the bulbar conjunctiva. In most cases there is permanent impairment or destruction of function from the extension of the process to all of the cornea. True xerosis consists of fatty degeneration of the epithelium. A case in a man of 32 treated with an autogenous vaccine by D. J. Rovirosa¹ resulted in almost complete vision with only a slight in-

(1) *Rev. de med y cirug.*, Oct. 21, 1915.

filtration in the upper and lower parts of the cornea. The vaccine was made with one hundred millions of the bacilli to the cubic centimeter. The doses injected began with 0.3 c.c. and went up to 2 c.c. This method seems to be innocuous, and its success in this case certainly appears to justify its trial in all similar cases.

Appendicitis Treated With Anticolon-Bacillus Serum and Vaccine. A. C. Guthrie² has employed this method in twenty-two patients who apparently recovered without the necessity of operative measures. Most of the cases were in the acute stage; a few of the patients showed symptoms of chronic appendicitis; and in one patient there was pain in the cecal region for two years after the appendix had been removed. The author's method of treatment was based upon the supposition that appendicitis may be due in some measure to infection by the *Bacillus coli*. The most suitable dose was found to be 20 c.c. anticolon-bacillus serum; 10 c.c. should be injected subcutaneously first in the right and then in the left hypochondriac region. A few days later 100 million colon-bacillus vaccine should be injected in a similar way into the deltoid region. This is supposed to prevent recurrence. As organisms other than the *B. coli* may be the determining cause of this disease, the "fixation of complement test" should be tried, using the patient's serum and the most probable organism (*B. coli*, pneumococcus, streptococcus), a corresponding serum of vaccine being used. The anticolon-bacillus serum is supposed to act chiefly as an antitoxin, also as a counter-irritant, causing local leukocytosis. It has also probably a physical effect, changing the equilibrium in the surrounding fluids and thereby producing increased osmotic pressure and favoring phagocytosis of the bacilli, as has been shown by Leduc.

Cancer Treated With Autolysin. H. S. Williams³ presents a summary on the autolysin treatment of cancer that represents the findings not alone of Dr. Beebe, but of sixty other regularly qualified practitioners who have had personal experience with autolysin in inoperable cases of cancer. There are also more than 300 other

(2) Brit. Med. Jour., Jan. 9, 1915.

(3) New York Med. Jour., Nov. 13, 1915.

physicians of corresponding standing in various parts of the country who have tested autolysin on at least one patient, tentative reports from a large number of whom are available. All told, 1,000 inoperable cases of cancer have been treated with autolysin. About 600 cases have been treated long enough to get somewhat definite results, the remaining 400 have been treated for too short a period to furnish material for a statistical summary. The writer finds that setting aside the small number of patients who were in such a desperate condition that no expectation was entertained that anything could be done for them, it may be said that a more or less specific action has been observed as a practically uniform sequel of the administration of autolysin, there was a marked alleviation of unfavorable symptoms, and in a good many of these cases life was somewhat prolonged. In fact, seemingly about 64.6 per cent. of the whole number have to some extent been benefited by the autolysin treatment.

Autoserum in Treatment of Cancer. According to O. Paget⁴ the belief that epithelial cells are important in protection and immunization against disease and also in its cure, led him to stimulate the skin cells by a blister and to inoculate the fluid therefrom into a man with inoperable carcinoma of the rectum. This was followed by marked improvement, the patient not only gaining in weight, but the tumor also greatly diminishing in size and hardness.

The Value of Autoserum Injections in Skin Diseases. W. S. Gottheil⁵ reviews the recent literature in reference to the use of autoserums in skin diseases and states that he has fairly complete records of thirty-one cases of psoriasis, nine cases of various forms of obstinate chronic eczema, seven cases of chronic urticaria, four cases of very bad pustular acne, five cases of furunculosis, five cases of pemphigus and eight cases of florid secondary syphilis, and several cases of chronic lichen planus, leprosy, and other chronic affections. From his experience with these cases he concludes as follows:

In psoriasis the autoserum treatment, while not in itself curative of the disease, is an important factor in the

(4) *Med. Record*, April 22, 1916.

(5) *New York Med. Jour.*, June 24, 1916.

treatment. It cuts down the time required for the troublesome local treatment from weeks to days, and enables us to promise to clear the skin in from two to five days in even the worst and most obstinate cases. It postpones relapses for a long time, possibly indefinitely. In most cases it so influences the type of the disease that the relapsing lesions are few and insignificant, and are readily amenable to mild local treatment.

In chronic urticaria, neurodermatitis, pruritus senilis, and other obstinate itchy dermatoses it is worthy of trial. In some cases the action is effective and brilliant.

It is of some value in bad pustular acne; but in furunculosis, folliculitis, and chronic eczema the same may be said as of acne; the injections are sometimes apparently effective, and at others fail entirely.

In pemphigus, lepra, and obstinate lichen planus it is ineffective.

In syphilis it is useless.

Autoserobacterine. The following technique for the preparation of autosenitized vaccines is given by M. G. Wohl:⁶

1. A pure culture is obtained from the lesion on solid medium. Three ordinary culture tubes are sufficient.
2. To each tube 1 c.c. of sterile normal salt solution is added. Shake the fluid so as to bring the microorganisms into suspension. To facilitate the washing off of the bacteria use a platinum loop.
3. Transfer the bacterial emulsion into a sterile tube to which sterile glass beads are added to break up the clumps.
4. The bacterial emulsion is standardized by Wright's method of counting the proportion of red corpuscles and bacteria in the unit of equal parts of blood and bacterial emulsion, and proper dilutions are prepared.
5. The vaccines are next sterilized in a water bath at 56° to 58° C. for from thirty to forty-five minutes.
6. Blood is obtained from the patient from a prominent vein at the elbow, from 5 to 10 c.c. under strict asepsis, placed in a cold place for three hours, and serum pipetted off.
7. Inactivate the serum at 56° C. for half an hour.

(6) Amer. Jour. Med. Sci., August, 1916.

8. Add from 1 to 3 c.c. of the inactivated serum to vaccine No. 1, and No. 2, if enough serum is obtained, place in incubator at 37° C. for six hours. For subsequent doses obtain more blood.

9. Culture vaccine to test its sterility and if it is found sterile, administer it hypodermically.

Serotherapy of Bubonic Plague. Moreno⁷ is physician in chief of the isolation hospital at Buenos Aires, and his conclusions are drawn from extensive experience. He asserts that a dose of 20 c.c. of antiplague vaccine for adults and 10 c.c. for children over 5 confers immunity, but only for about ten days. In treatment antiplague serum must be given in doses of 100 c.c. and the intravenous is the only reliable route; the injections should be repeated as indicated. Later re-injection of serum may induce general symptoms, but they are not so severe as those observed in laboratory animals under the same conditions, and they are never serious enough to justify withholding serotherapy in a case of bubonic plague. The disease is liable to be grave in any form in which it may appear, and consequently it always calls for serotherapy. Symptomatic measures should be applied as indicated to supplement the serotherapy. In conclusion he reiterates that injection of antiplague serum is the best treatment of plague, and that the numerous case reports published apparently demonstrate the superiority of the Argentine intensive intravenous method, as applied by Penna and himself. The peculiar gravity of pneumonic plague is due to the rapidity with which degenerative changes become installed, before serotherapy is applied. Local necrotic patches seem to be benefited by local application of the antiplague serum.

Treatment of Cerebrospinal Meningitis With Large Doses of Serum. From 1902 to 1915, seventy-five patients were treated by Marie Kurak,⁸ thirty-two of whom received the usual doses of serum. Of those receiving no serum, 69 per cent. died and 31 per cent. recovered; only 15 per cent., however, without after-symptoms of the disease. Of the injected group, 56 per cent. recovered, 39 per cent. without residual lesions. Analyzing twenty cases

(7) *Semana méd.*, Sept. 2, 1915.

(8) *Med. Kliník*, Sept. 19, 1915.

recently treated with serum injections, it was found that four of seven patients died after treatment with total amounts of serum up to 60 c.c.; two of seven died in the group which received up to 140 c.c. of serum; and all six patients receiving from 160 to 300 c.c. of serum recovered. The conclusion was that the best results were to be secured from the early institution of serum treatment and the administration of three or four consecutive doses of 40 c.c. intraspinally with as many doses of the same size given simultaneously into the muscles. This method gave both a much lower mortality and a much diminished tendency toward the persistence of residual lesions.

Efficacy of Antimeningococcus Serum in Epidemic Cerebrospinal Meningitis. In this report by A. Netter⁹ the results are based on a series of cases observed at the Hospital Trousseau in Paris during the 1915 epidemic. A generalized infection, a meningococcus septicemia, was frequently seen, generalized eruptions were quite common, especially generalized purpura. Exomeningeal localizations, such as suppurative arthritis, metastatic iridocyclitis, and ulcerative vegetative endocarditis have also been more frequent; 226 cases, treated with serum since March, 1908, show a mortality of 27.4 per cent. When the deaths occurring within twenty-four hours and those which could not be attributed to the meningococcus are deducted, the mortality is only 12.5 per cent. Before the serum was used the mortality was 48.5 per cent. for sporadic cerebrospinal meningitis and 83.3 per cent. in epidemic cerebrospinal meningitis. Some of the causes of death were association with tuberculous meningitis; broncho-pneumonia; tuberculous broncho-pneumonia, marasmus, and cachexia following obstinate vomiting. The decline in mortality is not the only result of the treatment with antimeningococcus serum. In general, the symptoms are milder, the recovery is more rapid, and complications and sequelae are rare. Owing to the rapid recovery extreme emaciation was never noticed in the convalescence. Intra-articular injections were given in cases of suppurative arthritis. In a case of vegetative endocarditis it was given intravenously. The serum should be given early, in large doses and repeated

(9) Brit. Jour. Chil. Dis., December, 1915.

often—at least daily for three days, and longer if the spinal fluid contains meningococci. Never less than 70 c.c. were given during the course of the treatment. In infants a symptom which should be looked for is prominence of the fontanelles. Meningococcal spasm may show itself in the form of purpura, a morbilliform eruption, inflammation of the joints or eyes, or fever of an intermittent type. Polyvalent serum gives better results than monovalent serum, as there are several species of parameningococci, each of which requires a special serum. Beside being given intramuscularly, intraspinaly, and intravenously, it has been injected into the lateral ventricles through the fontanelle in infants and after trephining, into the joints and into the vitreous of the eye.

A. C. Helmick¹⁰ says that unless there are distinct evidences of pressure, children over 2 years should receive 30 c.c. of serum, and babies 15 c.c., as a minimum dose, regardless of the amount of fluid withdrawn. Thirty cubic centimeters is the standard dose in mild cases, and in the chronic form when the organism is present. In the more severe form, and in fulminating cases, one should give serum sufficient in amount to give evidence of intradural pressure and a sensation of abnormal resistance. In all except the fulminating cases the dosage should not be repeated oftener than once in twenty-four hours, unless the symptoms become intensified. Every case, regardless of severity, should receive at last four injections of serum, and, if diplococci persist after the fourth dose, a continued daily dosage until they have disappeared.

Bulgarian Bacillus in Treatment of Vulvovaginitis. Cohen¹ claims that the *Bacillus bulgaricus* does not thrive in the human vagina and is, therefore, of little use in the treatment of vulvovaginitis. Three cases were treated by this method. Each patient had a very profuse discharge in which gonococcus-like organisms could be easily demonstrated in smears taken by the swab method. Smears from the vagina were examined twice weekly for the presence of Bulgarian bacilli and gonococcus-like organisms. Not once was the Bulgarian bacillus demon-

(10) Ohio State Med. Jour., January, 1915.

(1) Jour. Labor. and Clin. Med., July, 1916.

strated in direct smear even when it was taken within twelve hours after an injection. In two cases, after ten and thirteen days of treatment respectively, the discharge ceased and no gonococci could be found in the vaginal smears. The treatment was discontinued for two days during which time Bulgarian bacilli were demonstrated with some difficulty in cultures from the vagina using the glacial acetic acid method described by Heinemann and Heffermann. On the morning of the third day a discharge reappeared in which gonococcus-like organisms could be shown. Treatment, using the culture which had been isolated from the vagina two days previously, was resumed and was continued for three weeks. During this time several negative slides were obtained, but almost always after sufficient search a few typical gonococci could be found. The third patient developed measles on the eighth day of treatment and was transferred to the hospital for contagious diseases where the vaginitis was not treated. On the thirteenth day after developing measles, smears made from the vagina were positive for gonococcus-like organisms and negative for Bulgarian bacilli. The bacillus was demonstrated in small numbers by cultural methods.

Autoserotherapy for Gangrenous Venereal Ulcer. Treupel² relates that in two progressive cases of this kind, long uninfluenced by vigorous local measures, injection of the patient's own serum seemed to arrest the gangrenous process, and start the patient on the road to recovery. In the first case the gangrenous ulcer scabbed over and the scab was thrown off on the fifth day. Three injections of the patient's own active serum were given, in the course of four days, the amounts ranging from 10 to 24 c.c. In the second case four times these doses of serum or 100 c.c. of the blood were given and prompt benefit was apparent, the gangrene promptly healing. Febrile skin affections were likewise favorably influenced. In one case of petroleum eczema, with temperature of 40.4 C. (nearly 105 F.), the fever rapidly dropped and the skin affection retrogressed after a venesection of 50 c.c. of blood and intravenous injection of 200 c.c. of the patient's own blood. The cure was com-

(2) Med. Klinik, August 15, 1915.

pleted by two further injections in four days. The work issues from the university clinic for skin diseases at Jena, in charge of Spiethoff. He has found this autoserum beneficial also in treatment of catarrhal febrile sore throat and prostatitis, typhoid and tetanus.

Treatment of Fibrinous Pneumonia by Automicrobine. Vargas³ describes a case of lobar pneumonia in a boy of 3 years in whom a very favorable and apparently curative influence was exerted by the injection of an autogenous vaccine or microbine. The injection of 500,000 dead pneumococci on the fourth day of the disease resulted in a drop in temperature of 2° C., and a reduction of the respiration rate from eighty to fifty a minute. The next day the injection was repeated, 1,000,000 cocci being given, with steady improvement in the patient's condition; no further injections were needed.

Autoserotherapy in Pleurisy. E. A. Pierce⁴ directs attention to the fact that a large proportion of the cases of pleurisy with effusion are of tuberculous origin and contrasts the value of artificial pneumothorax with that of autoserotherapy in treatment of this affection. Against artificial pneumothorax are the facts that pleurisy with effusion is common and must often be treated under conditions which would render the successful application of compression and its maintenance almost impossible; that the method is not entirely safe, even in the hands of experts; that the pleura is damaged with respect to its phagocytic and bactericidal powers; that normal air cells are compressed; and that when adhesions are present danger of perforation of a tuberculous focus into the pneumothorax may be considerable. In favor of autoserotherapy it may be said that it is very simple, that it leads to absorption of the exudate in a short period of time in the majority of cases, and that it is entirely free from danger so long as we are careful to inject only perfectly clear serum removed from the chest. The simplest technique is to use a large all-glass syringe and a long needle. The needle should be introduced into the chest near the upper border of a rib to avoid the danger of injuring the intercostal vessels, and at least 10 c.c. of fluid

(3) Rev. de med y. cirug., Oct. 21, 1915.

(4) Northwest Med., December, 1915.

should be aspirated into the syringe. If this fluid is clear the needle should be partly withdrawn and its point thrust further under the skin, and the contents of the syringe, not to exceed 10 c.c., are injected subcutaneously. If at the end of a few days the fluid in the chest has not begun to recede, or if it stops receding after an initial diminution, the procedure should be repeated. There are no contra-indications to the method. Frequent careful examinations of the chest should be made during the treatment to determine changes in the level of the fluid.

Large Doses of Antitoxin in Treatment of Diphtheria.

A case is reported in which J. Gazzo⁵ gave single doses of 50,000 units of antitoxin daily for six days, then 30,000 units a day for four days, and a final dose of 10,000 units. The patient was a girl 4 years old who was suffering from a very intense diphtheritic infection involving the larynx, pharynx, uvula, and tonsils, associated with grave toxemia. Recovery was prompt and complete, beginning after the second dose.

No unfavorable symptoms were observed from these massive doses of antitoxin, and the author has since successfully treated several cases, giving 200,000 units in all to each patient. He suggests that there is less danger of producing serum sickness and other anaphylactic phenomena when these large doses are used; large doses lead to more permanent immunity than do smaller ones.

Intravenous and Intramuscular Administration of Diphtheria Antitoxin. The following rules or regulations have been adopted at the St. Louis Children's Hospital⁶ for the administration of diphtheria antitoxin. They embody the practical applications of the ideas presented by Veeder as well as the results of clinical experience. All patients with clinical diphtheria receive antitoxin on admission regardless of whether or not a culture has been taken. In mild and moderately severe cases from 3,000 to 5,000 units are given intramuscularly. In all severe or septic cases, and in all cases with a laryngeal involvement, 5,000 units are given intravenously. All cases seen late (fourth day) are given the antitoxin

(5) Pan-American Surg. and Med. Jour., January, 1915.

(6) Univ. Med. Record, October, 1915.

intravenously if the membrane is at all extensive. Individuals exposed to diphtheria are given an intradermic diphtheria toxin test (Schick test). In case the toxin reaction is positive in twenty-four hours, 1,000 units of antitoxin are given subcutaneously in older children, and 500 units in children under two years.

Treatment of Erysipelas With Diphtheria Serum. A case in which a woman 60 years old was suffering from a severe attack of erysipelas, and great improvement followed the administration of diphtheria serum is reported by H. Koller.⁷ The first dose of 3,000 units was given April 15. The next day 5 c.c. of electrargol were given by intravenous injection. On the seventeenth the second dose of the serum, 1,000 units, was given, and by the next day the patient was practically well. The course resembles closely that of a case reported by Pollak in 1915, but the extent to which it was influenced by the serum can not be said to be proved. Koller emphasizes the advantage of using electrargol in combination with the serum, and says that the two remedies work together harmoniously, but to which the result is to be attributed is not clear.

Serum Treatment of Typhus Fever. C. Nicolle and L. Blaizot,⁸ at a recent meeting of the *Académie des sciences*, Paris, reported that they had found it practicable to produce an immunity to typhus fever in horses and donkeys by repeated inoculations of emulsions of spleen or adrenals from guinea-pigs suffering from typhus infection. The serum thus obtained, tried first in animals, was found to possess distinct preventive as well as curative properties. It is non-toxic to man, and was used in nineteen patients with typhus fever, with favorable results.

Bacteriotherapy of Acute Infectious Diseases. In the treatment of typhoid with injections of vaccine, it has been found by Kraus⁹ that after the second and third injection the temperature falls by lysis and the case goes on to cure. The injections are given in doses of from five to one hundred million and the bacteria are killed

(7) Cor.-bl. f. Schweizer Aertze, July 8, 1916.

(8) Presse méd., April 13, 1916.

(9) Wien. klin. Wochenschr., Jan. 14, 1915.

either by heat at 70° C. or by ether. Intravenous injections give better results than the subcutaneous. After intravenous injections there is a sharp rise of temperature followed by a sharp decline. The death-rate was 11 per cent. in a series of cases that were injected compared to 30 per cent. in non-injected cases. Whether the drop in temperature following the injection of typhoid bacilli is an anaphylactic phenomenon is questionable. Bacterial anaphylaxis is as specific as serum treatment. Animals treated with a specific germ do not show any anaphylactic phenomena when other germs are injected. Injections of *Bacillus coli* were given and it was proved that the patients reacted in a similar way as when typhoid bacilli were injected, showing that the reduction in temperature could not be attributed to anaphylaxis. Colon bacilli in the dose of from twenty-five to fifty million were injected intravenously in cases of puerperal infection with good results; also with success in staphylococcus septicemia and infections produced by *Bacillus pyocyaneus*.

Bacterin Treatment of Pyogenic Dermatoses. Seventy cases were selected by Dennie and Bufford¹ for the experiment: acne vulgaris, thirty-five cases; furunculosis, twenty-one cases; folliculitis, fourteen cases. The seventy cases were roughly divided into two groups, one of which was to receive only autogenous and the other stock preparations. In both instances, however, the bacterins employed were made by the authors themselves. No commercial products were used. When the autogenous bacterins were made, a large amount was prepared and the excess used as the stock preparations. An initial dose of not less than one hundred million and not over four million killed organisms was given. The last injection was often two billion. The total number of doses rarely exceeded ten and the interval between was from four to ten days. The administration of bacterins was governed by the local reaction at the point of injection. If this reaction did not occur either at the first or any of the subsequent injections, a new preparation was made and administered. The general reaction was usually so slight that it escaped the attention of the patient. When there

(1) Boston Med. and Surg. Jour., Dec. 9, 1915.

was an increase in the intensity or number of eruptive elements, the following dose was much smaller and was given when the untoward symptoms had subsided. If the patient improved up to a certain point and then remained at a standstill, a new bacterin was prepared and administered. If the patient grew progressively worse after each injection of bacterin, this mode of treatment was discontinued.

The best results were secured in furunculosis. The action of bacterins in the treatment of sycosis was erratic; in one case of twenty years' duration in which external treatment had been faithfully used for five years and in which stock bacterins had been administered, autogenous bacterins were used with remarkable success. On the other hand two cases were much aggravated by this form of treatment. The average number of doses administered in successful cases was, eight in acne, four in furunculosis and four in sycosis. In nearly all cases the initial dose was two hundred million and the final one to two billion killed organisms. The most favorable interval between doses was found to be five days in acne, four days in furunculosis and seven days in sycosis.

Typhoid Treated With Bacterins. Fourteen patients were treated by Waitzfelder² with bacterins and two ordinary, average cases with the average amount of toxemia and temperature were used as controls; that is, they received no bacterins and were treated symptomatically. All the patients were placed on high calory diet, the amount in children varying from 500 to 2,000 calories a day, and in adults from 700 to 3,000 calories a day. In every case the typhoid bacillus was recovered from the blood, feces, or urine. The injections were given intramuscularly. The doses varied from 66 to 800 millions, the largest dose apparently acting best. The period of convalescence was materially shortened; all the patients were in condition to resume their usual vocation within one month after leaving bed, the average invalidism therefore being less than nine weeks. From this limited experience Waitzfelder is inclined to think the administration of bacterins in typhoid is of service, in that it lessens the toxic symptoms.

(2) New York Med. Jour., Dec. 18, 1915.

Vaccine Treatment. The more or less unsatisfactory state of vaccine therapy at the present day is discussed by Ludvig Hektoen,¹ who points out the highly specific nature of different strains of bacteria of the same family. Owing to this high degree of specificity, which is daily becoming more apparent, it is largely empirical and unscientific he declares to employ commercially prepared vaccines, even if mixed and polyvalent. Rational vaccine therapy calls for the use of the particular organism, or organisms responsible for the condition under treatment. A further unscientific practice in vaccine therapy is the use of these agents in acute infections, with the exception, perhaps, of typhoid fever. In this latter condition the accumulated evidence seems to indicate that some benefit, often marked, is to be derived in a large proportion of cases from the proper intravenous administration of typhoid vaccine. It must be mentioned, however, in this connection that the benefit does not seem to be a specific one, for other vaccines and even albumose similarly administered have been reported to have given as good results as typhoid fever. The action is probably connected with the stimulation of the production of non-specific ferments. The legitimate field for vaccine therapy seems to be restricted to subacute and chronic localized infections and to the use of autogenous vaccines. The haphazard use of commercial stock vaccines and culture filtrates not only does not contribute to the advance of our understanding of the subject of vaccine therapy, but serves to create much confusion.

Mixed Vaccines. A. A. Thibaudau² states that being acquainted with the results of experiments on laboratory animals which showed that the injection of bacterial derivatives resulted in an increase in the opsonic index of the animals, and that the increase in this index was specific, being raised to those germs only which were used in the preparation, he has endeavored to correlate these two assumptions with the opsonic theory of Wright and the phagocytic theory of Metchnikoff. He selected for his study of the blood surgical patients who had proved refractory to regular treatment and observed the changes

(1) Jour. Amer. Med. Ass'n., May 20, 1916.

(2) New York Med. Jour., Feb. 26, 1916.

produced by the injection of phylacogen from which he concludes as follows:

1. The intravenous administration of phylacogen is followed by a prompt (about four hours) and marked leukocytosis, which is seen by making leukocyte determinations at two hour intervals.

2. A considerable increase in the proportion of polymorphonuclear leukocytes is also noted by the same means; therefore, the actual number of these leukocytes (phagocytes) is markedly increased.

3. The intravenous administration of mixed vaccines in these cases promptly increased the opsonic index to the infecting microorganisms isolated from the patient, even when they were of two or more species.

4. These phenomena are usually (not always) synchronous with certain characteristic changes (rises) in the pulse, temperature, and blood-pressure, which are followed by a fall to normal or even subnormal.

5. Coincidental with the phenomena noted above was marked improvement in the clinical condition for which treatment had been instituted.

6. Mixed vaccines, in the author's opinion, represent multiple antigens, their therapeutic efficiency being due to their ability to stimulate the formation of antibodies.

7. Their action resembles in a general way that of bacterial vaccines. The action, however, is more prompt (1, 2, and 3 above), owing probably to the elimination of the delay incident to the splitting of the bacterial cell, the metabolic products (bacterial derivatives) concerned in their action being immediately available. At the same time their action is probably not so permanent as that of the vaccines, because of their more rapid absorption.

Asthma and Ozena Treated With Autogenous Vaccines. After numerous experiments with rabbits Klenk³ concluded that the coccobacillus of Perez was the true cause of ozena. In nearly all cases treated he used vaccines composed of a pure culture of the coccobacillus isolated from the patient's nose. The vaccines are usually prepared from the semiliquid portions of the greenish, foul smelling crusts. At least ten or twelve cultures

(3) Missouri State Med. Ass'n. Jour., May, vol. 13.

are made on albuminized agar contained in large wide tubes. In several instances absolutely pure cultures were obtained with the somewhat modified typical odor of the original condition. If the patient's serum from which the organism has been isolated agglutinates the bacteria obtained from the rabbit in a dilution of at least 1 to 30 the findings are positive and the organism is used in preparation of the vaccine.

Klenk is certain that with improved technique most cases of ozena will be markedly improved and ultimately cured. Many of the patients who have been under treatment, with the exception of the atrophy, appear cured. Some of the patients who are not doing well did not give positive agglutination tests and in others he was not able to isolate the coccobacillus. The autogenous vaccine for the treatment of asthma is at present in the experimental stage. Klenk has not had the opportunity to try the vaccines on more than twelve or fifteen patients but the results obtained are very gratifying. He has not been able, nor has he attempted, to isolate a specific organism in the preparation of the vaccine, but he uses all pathogenic bacteria found in the material submitted.

Vaccines in Treatment of Arthritis. Seaborn⁴ writes that it is now well recognized that the focus of chronic suppuration must be removed, whether it be the tonsils, teeth, nasal fossa, appendix, or prostate. He declares that in many cases, after most careful search, when the serum in the joint is negative the offending organism may be located in the lymphatic gland nearest to the disturbance and a vaccine made from a culture.

Vaccine Therapy in Chronic Bronchitis. H. A. Cables⁵ lays stress on the adequate differentiation of chronic bronchitis with abundant sputum from pulmonary tuberculosis, and calls attention to the efficacy of vaccine treatment in the former. In chronic inflammation of the finer divisions of the bronchial tract there is a great tendency to localization and, to some extent, one is able to determine the causative agent, *e. g.*, the streptococcus, staphylococcus, or influenza bacillus. The streptococcal form is usually more widespread than the other varieties,

(4) Canadian Practitioner.
(5) Lancet-Clinic, July 22, 1916.

and is manifested in afternoon fever and tachycardia, night sweats, loss of weight, and muco-purulent yellowish or greenish yellow sputum. Differentiation from tuberculosis is at times only possible by painstaking examination of the sputum, by the tuberculin test, and by carefully considered physical findings. The staphylococcal type is generally more localized and the symptoms are less severe.

In the treatment, Cables uses stock vaccines of the Van Cott formula. The first dose given is a large one, to excite the formation of a great amount of antibodies. The interval between doses is always at least four days, and is lengthened to a week or ten days as improvement takes place. Codeine, $\frac{1}{4}$ grain, every two hours, is often given to procure temporary relief before the action of the vaccine is brought into play. A typical dose of vaccine contains fifty million streptococci, one hundred million each of colon bacilli and pneumococci, and five hundred million staphylococci. The improvement following each dose depends on the severity of the reaction, which is partly local and partly systemic. Histories of cases are given illustrating the benefit obtained. Great care was taken to eliminate cases of tuberculous infection. No auxiliary treatment was given.

Vaccine Treatment of Asthma. Promising results have been obtained by Rogers⁶ in a number of cases of asthma by vaccine treatment. Cultures were made from freshly obtained sputum; subcultures were made from the fine pneumococcal and streptococcal-like colonies, a number of them being taken up so as to get as many strains as possible in the tubes used for making the vaccine. Occasionally the culture consisted so purely of fine colonies that the vaccine could be prepared from the primary culture, but this was exceptional. A solution of 5 c.c. of sterile salt was added to each tube, which was then heated to from 56 to 60 C. for one hour; 0.5 per cent. phenol was added, and after mixing well, the fluid was put up in doses of 0.5 and 1 c.c. The first dose was 0.5 c.c., which usually contained somewhere about 50,000,000 organisms. If no febrile but only a little local reaction occurred, a dose of 1 c.c. was given after five days, and

(6) Practitioner, June, 1916.

repeated weekly. Occasionally the dose was increased to 1.5 or 2 c.c., but as a rule this was unnecessary.

Vaccine Treatment of Gonorrhea. C. C. Warden⁷ presents the results of the treatment of gonorrhea with gonococcus fats which he says are to be regarded as tentative. The cases treated thus far comprise acute, chronic, simple and complicated in men and infant girls. In all the subcutaneous inoculation of the fats has been followed by marked improvement and in some by undoubted cure. The chronic cases, with posterior involvement and with slight but constant discharge containing gonococci in smear and culture, have shown disappearance of the cocci in the discharge and symptoms in from one to three inoculations. The acute cases taken within the first forty-eight hours of the discharge showed complete disappearance of the cocci in smears and cultures and entire absence of the discharge within a week following one inoculation. Between these extremes are those cases showing well-established infection, copious discharge, and considerable edema, which have required more frequent inoculation with increasing doses and which constitute an improved but unfinished series. There has been a slight reaction in the subcutaneous tissues, which quickly subsides. In some instances the constitutional reaction characterized by chilly sensations, anorexia, and some fever appeared in from six to eight hours. This reaction has not been constant, but is followed by marked clinical improvement. The coincidence of the disappearance of the cocci and the constitutional reaction together with his experience with anaphylaxis in animals following the administration of fresh gonococcus autolysates, or following lysis of whole cocci *in vivo*, has led Warden to infer that the reaction in question may be due to the sudden lysis of the cocci in the body of the patient.

Human Serum and Blood in Treatment of Psoriasis and Other Skin Diseases. Howard Fox⁸ reports that after a trial of autogenous serum in sixty cases of psoriasis, he is convinced that the serum has no effect in this disease. He appears to lean toward the view that the serum, in combination with the local treatment by chrysa-

(7) Jour. Amer. Med. Ass'n., Dec. 11, 1915.

(8) Jour. Cut. Dis., September, 1916.

robin ointment, yields better results than the use of the ointment alone. The exact cause of this unknown. It may be due either to the operation of bleeding or to the mental attitude of the patient, because of his feeling that a new and possibly successful method of treatment is being employed in his case. The technique of giving serum is simple and devoid of danger. In other skin diseases, the use of autogenous or heterogenous serum seems to be disappointing, Fox thinks, except in dermatitis herpetiformis, where its use is rather encouraging.

Autogenous Vaccines in Treatment of Sciatica. The vaccine treatment of sciatica has not received the attention it deserves. Little is said about it in text-books, and only gonococcus vaccine is mentioned. The source of infection, the infection focus, must be determined. It usually can be found by patient, persistent search, and when it has been discovered, a vaccine is easily obtained. In a successful case which Zapffe⁹ reports a mixed vaccine was employed which was made from a culture of staphylococci and a diphtheroid bacillus found in the urine.

Artificial Cultivation of Variola-Vaccine Virus. Proescher¹ reviews the work in this field and expresses his belief that the virus of smallpox is a filtrable micro-organism, visible in dark-field illumination, staining rather weakly. Taking some U. S. Government vaccine he inoculated the cornea of a rabbit and produced a typical vaccine keratitis with an abundance of so-called Guarnieri's corpuscles. When the lymph was studied with the dark-field minute cocci and diplococci were visible, as well as epithelial cells filled with the latter. Vital staining of these bodies proved impossible. The lymph was then diluted, rapidly centrifugalized, and the sediment placed on cover glasses in smears, the latter then dried and treated with various stains. The difficulty in staining may be due to preservation of the lymph in glycerine. After infinite pains in technique the author concludes that both intracellular and extracellular forms of virus co-exist, although the minute extracellular organism must have originally escaped from the cells.

(9) Jour. Amer. Med. Ass'n., Jan. 16, 1915.

(1) Berlin. klin. Wochenschr., Aug. 23, 1915.

Proescher succeeded in cultivating similar organisms from the unfiltered and filtered virus and from the cultures produced the characteristic keratitis in the rabbit but here, he says, the matter rests. We do not know what these bodies are—whether bacteria or protozoa—and as yet the subject of immunizing with cultures has not been studied, nor that of the formation of antitoxic or bactericidal antibodies. The first culture *in vitro* could not at first be propagated in media such as ascites and serum bouillon but after the addition of a carbohydrate like maltose a luxuriant growth was obtained under anaërobic conditions. The author has now carried it through twenty-eight generations. The great difficulty lay in making the first culture. The virus seems to weaken rapidly in virulence in the incubator at 37 C. Strange to state when inoculated directly into animal tissues which have approximately the same temperature the virus maintains its virulence and multiples. Glycerine is believed to explain this behavior *in vitro*. To obtain the first culture ascites fluid, guinea-pig serum, and bits of aseptic kidney, etc., from the same animal are placed in a sterile tubule, and tested again for sterility after forty-eight hours in the incubator. One-tenth of a cubic centimeter sterile virus is then inoculated into the tube which is allowed to remain in the incubator for two weeks under strict anaërobic conditions. The colonies are seen as a faint haze about the bits of flesh. Dark field illumination now shows that these are composed of the specific formation already described.

Vaccine Treatment in Streptococcus Puerperal Fever. Chalmers and O'Farrell² cite two cases of puerperal fever caused by the fecalis group of streptococci in which vaccine therapy was successful. The first patient, a multipara, had an easy confinement which was conducted without intravaginal examination. She kept quite well for seven days, when for the first time she received an intravaginal douche, after which the fever began.

No organisms were obtained from the peripheral blood, but an intra-uterine swab produced a pure growth of a streptococcus, which eventually proved to be *Strepto-*

(2) Jour. Trop. Med. and Hyg., April 1, 1916.

coccus vervatilis, belonging to the fecalis group. The patient at first only received antistreptococcus serum, but on admission into the hospital the uterus was thoroughly cleansed. An autogenous vaccine was given in a 5,000,000 dose six days after the preliminary dose of *Streptococcus salivarius* (stock vaccine). This vaccine also appeared to do no good, and five days later the patient became obviously worse, when 200,000,000 of the fecalis group vaccine were administered. She made a good and rapid recovery. This is obviously a chronic case in which the treatment of uterine cleansing and antistreptococcus serum did much good, while the heterologous vaccine did no good, but a large dose of the homologous vaccine produced a cure.

The second case was a very severe type of fever which had lasted six days, and when first seen the patient had a temperature of 104.6 F. There was much purulent discharge from the uterus. The uterus was douched out with antiseptics, but this had to be stopped on the third day as the patient's friends refused to allow it to be done, and she had to trust entirely to vaccine therapy. As some human fecal matter had been observed in the vagina, it was decided to treat her at once with the same vaccine as that made from the first case, and this was done in less than twenty-four hours after the case had been first seen. She received a 5,000,000 dose, and, as the effect was slightly to lower the temperature, and as the patient showed some improvement three days later she received 50,000,000, when the temperature gradually fell, reaching 100 F. on the sixth day after the first vaccine dose. On the next day it rose to 102.6 F. in the evening, and next day (eighth day after first injection), she received 200,000,000 the temperature declined and reached normal on the third day after this dose, and the eleventh day after the commencement of vaccine therapy; she made a good recovery.

Simultaneous Inoculation With Typhoid and Cholera Vaccines. A few careful experiments led K. E. F. Schmitz³ to the conclusion that the reaction was no greater than when the vaccination was undertaken sep-

(3) Berlin. klin. Wochenschr., May 31, 1915.

arately for each disease and that the immunity produced against each disease was higher than with separate inoculation. In addition, the injections could be given at weekly intervals, the whole period of inoculation thereby being reduced from five to three weeks.

Vaccination in Dysentery Epidemic. There was a mortality of 19.4 per cent. in the sixty-seven cases of dysentery reported by K. Hever and F. Lucksh⁴ as occurring in a small town, all in about one month. Then all the sick were sent to a special hospital. Search was made for carriers in the infected houses and several were found and sent away also. All the adults left were inoculated with a polyvalent vaccine, a total of 342 persons out of a population of 800. About 243 were inoculated twice. The reaction was always mild, generally merely a little local redness, swelling and painfulness. A few had headache, and there was diarrhea for a few days in some. In exceptional cases there was a little fever, with a chill, the day of the inoculation. The fifty-one children over 4 years old, in the infected houses, were all given an injection of polyvalent immune serum. The epidemic was promptly arrested.

Preparation of a Non-Toxic Dysentery Vaccine. It is well known that the rabbit is highly susceptible to Shiga's dysentery bacillus and succumbs to it so readily as to make the preparation of an antiserum very difficult. Experiments carried out by H. R. Dean and R. S. Adamson⁵ led to the discovery that the toxicity of Shiga vaccines could be greatly diminished by exposure of the emulsions of these organisms to the action of dilute solutions of hypochlorous acid in the form of eusol, or to hydrogen peroxide. The injection of vaccine thus treated was followed in rabbits by the development of a satisfactory degree of immunity. Such a vaccine was also tried on man and proved to be relatively non-toxic. It produced a local reaction which was only a little more marked than that usually seen from prophylactic typhoid vaccine injections, and constitutional symptoms were wholly absent. It is suggested that the same method for the reduction of preparation of typhoid and other vac-

(4) *Wien. klin. Wochenschr.*, Oct. 21, 1915.
(5) *Brit. Med. Jour.*, April 29, 1916.

cines to reduce their toxicity and the reactions which they produce.

Prophylactic Vaccination Against Hay Fever. B. P. Sormani⁶ gives an outline of his work and results in the vaccination or active immunization of hay fever with pollen extract in forty-eight cases last year. He gives in part the methods of treatment of Noon and Freeman and shows wherein he disagrees with them. In January, February, or March, he began the treatment by administering a dose of 10 u.p., increasing the amount every week as fast as possible in each case. He usually proceeded up to 1,000 u.p., but when the patient showed symptoms of an overdose the increase was very slow or not at all. He prepared the extract by grinding the pollen by rubbing it with sterile sand, and made the extract with distilled water. This extract was not boiled, but was sterilized by adding one-tenth of its volume of 5 per cent. phenol solution, after which salt was added up to 0.85 per cent. Carbolic acid was not added to the extract which had to serve for the ophthalmic reaction, but it was boiled ten minutes, as Freeman does. Fresh vaccine was always used for inoculations. In each case the ophthalmic reaction is determined. Usually a resistance was found of 500 u.p. The reaction is not sharp, nor such as to serve as a guide to treatment. Sormani, however, considers it of the highest importance for diagnostic purposes in the beginning, for by this means he proved that two cases of suspected hay fever were something else. All other patients showed a clear positive reaction. The lowest resistance was 5 u.p., and the highest 5,000 u.p. Almost all of these patients had been treated in every possible way. In passing it may be observed that the year 1915 was a very severe hay fever-year. Sormani gives his treatment for 1915 as follows:

The initial dose was 10 u.p. A little reddening and swelling were observed at the point of injection. The dose was increased every week as follows: 20, 30, 40, 50, 70, 90 and then beyond 100 more rapidly, thus: 150, 200, 300, 400, 500, etc. He desired to carry the final dose up to 1,000 u.p., but found it a high dose. Some patients were cured by a much smaller final dose than 1,000

(6) *Lancet*, Feb. 12, 1916.

u.p. He considers it wise to proceed to a higher dosage, if during the preceding immunization nothing has appeared leading to a suspicion of hypersensibility, such as general itching or symptoms of an attack of hay fever. At the end of May the treatment was stopped, but a patient was requested to return if any symptoms appeared. If a patient returned a smaller dose was given, a decrease of 50 or 100 u.p., for fear of a negative phase. In the hay fever season he began with 5 to 10 u.p. only increasing when necessary up to 25 or 50 u.p. Of fourteen patients treated prophylactically six were completely cured, six had few of their former symptoms, while two considered no benefit to have been received. Of twelve patients treated prophylactically four were completely cured, three felt more or less relief, and five no relief at all. Of nineteen patients treated prophylactically by other physicians all found much relief, while three treated therapeutically found relief.

Hay Fever: Its Treatment With Autogenous Vaccines and Pollen Extract. Six cases of hay fever treated with autogenous vaccines were reported by Leon S. Medalia.⁷ The results given are encouraging. The cultures were obtained by passing a sterile swab along the floor of the nose to the posterior wall of the pharynx in such a way as to wipe off as much of the mucous lining of the passage as possible during the withdrawal, and then implanting in the ordinary way on glucose agar, blood serum, bouillon, and blood agar. Several tubes of glucose agar slants are used, sufficient for an autovaccine. Cultures are also made from the throat by swabbing off the tonsils, going as deeply as possible between the pillars of the fauces, and from the conjunctiva by placing a swab upon it, covering it with the lids, and having the patient squeeze the lids tightly so as to have the swab soak up any secretion present. As a rule the growth was found sufficient for the preparation of autogenous vaccines at the end of twenty-four hours, and these were made in the ordinary way. Four of the cases were treated with pollen extract alongside of the autogenous vaccines, but the results obtained from the vaccines alone, as well as from the combined method, and the way these

(7) Boston Med. and Surg. Jour., Aug. 10, 1916.

same patients reacted to the vaccines prior to the use of the pollen extract, make the author feel that the pollen extracts can be dispensed with. One patient with hay fever and asthma of over twenty years' standing has been under observation since March, 1911. The relief in response to the autogenous vaccine was marked. The patient needs two or three treatments each year, which produce no discomfort. She has had no asthma practically from the beginning of the treatment, and has been free from hay fever, with the exception of a slight transient attack following a long automobile trip. This the writer believes to be the only case of hay fever on record in which autogenous vaccine has been used for such a length of time. No pollen extract was used in this case. It is worth noting that four of the six patients gave a family history of hay fever, which is confirmatory of the suggestion already made that there is a hereditary predisposition of this disease.

Reaction of Antityphoid Vaccination. Tonnel⁸ studied the reaction as 5,000 men were vaccinated against typhoid and paratyphoid, and he here summarizes the detailed findings as recorded with minute care in thirty healthy soldiers and in twenty who were already under hospital care:

There was always more or less of a reaction evident in the blood and urine, but in some of the men it was so exaggerated as to be actually pathologic. He noted with surprise that the reaction was least intense in the tuberculous and those with albuminuria, while some of the apparently healthy responded with a pathologic reaction. There is always more or less destruction of red corpuscles; a loss of half a million may be regarded as the average. This suggests the necessity for caution in vaccinating persons known to have unusually fragile corpuscles. Kidney disorders also call for caution. After the vaccinations the urine becomes much less toxic. His test for this was with infusoria placed in the urine. They die in a few seconds in normal urine. The reduction in toxicity may be estimated from the length of the survival of the infusoria. With a pathologic reaction to vaccination, the infusoria persist unharmed in the urine

(8) Lyon mēd., April, 1916.

while the uric acid and urobilin content of the urine is much increased, and the red count is much less.

Typhoid Infections and Antityphoid Vaccination. Comparative trial of the agglutination test, cultures from the feces, and cultures from the blood in a large number of cases led Leon Bernard⁹ to the conclusion that the last-mentioned method is alone trustworthy in the diagnosis of typhoid infection, especially as regards its differentiation from paratyphoid infections. Among 325 positive blood cultures, seventy-seven were typhoid and 248 paratyphoid. Among unvaccinated subjects paratyphoid organisms were found twenty-six times and typhoid thirty-two times, whereas among subjects previously vaccinated against typhoid, 167 showed paratyphoid and thirty-four typhoid organisms. The characteristic manifestations of typhoid disease were not modified by antityphoid vaccination, but the mortality was reduced from 21.9 per cent. in thirty-two unvaccinated patients to *nil* in thirty-four vaccinated. The mortality in paratyphoid cases was reduced from 11.5 per cent. to 6.58 per cent. by antityphoid vaccination. Bernard does not believe typhoid cases can be clinically differentiated from paratyphoid cases, except in their less severity. Paratyphoid and typhoid organisms should not be considered to belong to different species.

Antityphoid Vaccination and Paratyphoid Fever. Labbe¹ presents a diagram consisting of curves comparing the vaccinated and non-vaccinated cases of typhoid and paratyphoid fever received at and cared for in the military hospital under his direction. At first, the majority of the soldiers being unvaccinated, typhoid fever was rife and the paratyphoid infections exceptional. Later, as more men were vaccinated, typhoid cases became less, and paratyphoid cases more frequent. In the period when the numbers of vaccinated and unvaccinated were about even, the number of typhoid and paratyphoid cases received were likewise equal. Finally, the troops consisting almost entirely of vaccinated men, the cases received were practically all paratyphoid. The replacement of typhoid by paratyphoid fever is not,

(9) Bull. de l'acad. de méd., Sept. 28, 1915.

(1) Presse méd., Jan. 17, 1916.

however, to be viewed as showing that antityphoid vaccination predisposes to paratyphoid infection. The results are explained by the fact that where both infections prevail unvaccinated subjects acquire typhoid fever, while the vaccinated have paratyphoid. As the vaccinated subjects can become infected only with the paratyphoid organisms, their chances of acquiring either infection are greatly reduced, the curve showing a marked drop in combined typhoid and paratyphoid infections as vaccination was more generally enforced. The mortality was reduced even much more than the morbidity, the paratyphoid infections substituted for the typhoid being, as a rule, less severe. The mortality among unvaccinated paratyphoid cases in the author's hospital was but 5 per cent., while that among unvaccinated typhoid cases was 25 per cent. Among paratyphoid patients previously vaccinated against typhoid fever that mortality was practically *nil*, showing that antityphoid vaccination is of some value even against paratyphoid disease. The life-saving effect of antityphoid vaccination in general was shown by the fact that, in the beginning, when the subjects treated were unvaccinated, the mortality was 16.9 per cent., whereas recently, most of the patients admitted having been vaccinated, the mortality has fallen to 8.3 per cent.

Vaccination Against Typhoid. Rimbaud² deplors that the present technique for vaccination against typhoid does not protect against paratyphoid. This has continued its ravages, while typhoid has been nearly stamped out in the French army in the region where he is stationed. There were 222 cases of typhoid in the non-vaccinated, and typhoid bacilli were cultivated from the blood in 50.9 per cent., but paratyphoid bacilli were found only in 10.3 per cent., while the latter bacilli were found in 35 per cent. of the 434 vaccinated who developed a typhoidal condition. True typhoid bacilli were found in 19 per cent. of the twenty-one vaccinated but once; in 11.5 per cent. of the 146 vaccinated three times and only in 6.8 per cent of the 145 four times vaccinated.

Use of Stock Vaccine in Infection by Bacillus

(2) Presse m d., Nov. 11, 1915.

Typhosus. T. H. Whittington* analyzes the effect of stock typhoid vaccine in a series of 230 cases, 115 of which were treated with the vaccine and 115 without it. He has tried to be certain of the following essentials:

1. Proof of infection by *B. typhosus* in all the cases, including the controls.

2. Accurate selection of the control cases—that is, (a) so far as possible the classes of cases and groups of cases compared are of the same degree of severity; (b) there is the same state or lack of inoculation in the cases compared; (c) all the cases occurred in the same season of the year, and in the same climate and locality; (d) all were of the same sex, and of about the same age and previous health; and (e) other modes of treatment, nursing, diet, etc., were similar.

The total mortality in the 230 cases was fifty-two, or 22.6 per cent.; twenty-nine deaths occurred among the vaccinated patients, or 25 per cent.; twenty-three deaths occurred among the unvaccinated individuals, or 20 per cent. The average length of the primary period of pyrexia (neglecting fatal cases) was 27.5 days. The average date on which the temperature settled was the 29th days in the vaccinated cases and the 26th day in the unvaccinated cases. The total number of cases having a relapse was twenty-two, or 9.5 per cent.; of these, twelve occurred among the vaccinated and ten among the unvaccinated.. The total number of cases with complications or sequelae of some kind or other was 111, and of these, fifty-eight were among those who had vaccine and fifty-three among the unvaccinated. Hemorrhage from the bowel was the cause of death or the deciding factor in six of the vaccinated cases and five of the controls. It was noted that in some of the cases the hemorrhages started just after a dose of vaccine or recurred after a dose. In summarizing, Whittington says that good results with the use of vaccines were more often obtained where good results can be expected by ordinary methods of treatment alone. Those patients who had much bronchitis or broncho-pneumonia ran the severe course which is usual and vaccine appeared to be of no avail. It appears that it is in just those cases in

(*) Lancet, April 8, 1916.

which the physician so much requires help that vaccine is disappointing. It seems that vaccine neither shortens the fever nor reduces the number of complications, and there is a decided suspicion that vaccine increases the incidence of hemorrhage. It seems, therefore, that the use of stock vaccine can not be recommended as a routine measure in the treatment of typhoid fever.

Intravenous Use of Sensitized Vaccines in Typhoid. Fritz Meyer⁴ gave doses ranging from 200 to 1,000 million killed sensitized typhoid organisms intravenously, at intervals of three days, to a series of patients with typhoid fever and secured favorable results. His main object, however, was to study the possible ill effects of this form of specific treatment. Aside from a slight local reaction at the site of the injection and a slight, temporary elevation of the temperature with some increase in headache, the injections produced no bad effects. Following each injection there was a decided reduction in the number of leukocytes, which was greatest after the first dose. In all cases the subjective improvement of the patients was marked. Meyer regards the early therapeutic administration of small ascending intravenous doses of sensitized typhoid bacilli as a safe and valuable therapeutic procedure.

Typhoid Treated by Injections of Polyvalent Sensitized Typhoid Vaccine Sediment. This article deals with the study of 105 cases of suspected typhoid. In sixty-five of the 105 cases the diagnosis of typhoid was made from both clinical and laboratory data. In these sixty-five cases the Widal was positive in sixty (93.7 per cent.) and as early as the fifth day, the high percentage of results being due, in a large measure, to the method employed, namely, the use of the macroscopic method and a formaldehydized culture of the typhoid bacillus. Of the blood cultures taken in fifty-eight cases there were forty positive (70 per cent.), including a case first seen on the thirty-second day. In only one case of the sixty-five were both Widal and blood culture negative, which case was diagnosed by the presence of *B. typhosus* in the stools.

The method of treatment employed by Gay and Chick-

(4) Berlin. klin. Wochenschr., Aug. 16, 1915.

ering⁵ consisted in the intravenous injection of from 1/50 to 1/25 milligram (150 to 300 million bacteria) of a sensitized, polyvalent, killed typhoid vaccine sediment prepared after the method of Gay and Claypole. In 66 per cent. of the cases a distinct benefit was obtained; in 41.5 per cent. of this 66 per cent. the recovery was of an abortive form with a critical fall of temperature and a permanent normal temperature established within a few days. This permanent normal temperature was reached on an average seven days after beginning treatment in these cases. A series of subcutaneous injections following the intravenous treatment apparently aids in preventing relapses.

Intravenous Use of Typhoid Vaccine in Typhoid Fever. J. L. Miller⁶ reviews the literature on this procedure since it was first used by Fraenkel, in 1893. Statistics vary so much that it is impossible to draw definite conclusions as to reduction of mortality, although it appears that the intensity and duration of the disease are lessened. The one striking feature of the treatment is the immediate and permanent interruption of the fever. The initial dose recommended is 300 million bacilli; and crisis may follow even a second or third injection of the same or a larger dose. Violent reaction with a chill is usual, and though alarming is apparently not dangerous.

Vaccine Therapy in Typhoid in the Immunized. Comparative observations made in a single outbreak of typhoid fever by Karl Mayer⁷ proved that antityphoid vaccine materially shortened the course of the disease and diminished its severity and mortality among patients who had previously received prophylactic injections of vaccine. The vaccine was given subcutaneously in increasing doses at intervals of two days. From three to five injections only were required to reduce the temperature to normal. The vaccine was a sensitized one, containing killed organisms and standardized in terms of weight of fresh culture per cubic centimeter of finished product.

(5) Arch. Int. Med., February, 1916.
(6) Illinois Med. Jour., January, 1916.
(7) Med. Klinik, Jan. 2, 1916.

Vaccine Treatment of Typhoid. In series of cases reported by A. von Koranyi,⁸ Ichikawa's serum was employed. The dose given was from 0.4 to 0.5 c.c. The dose of 0.3 c.c. was found to be too small, while the dose of 0.6 to 0.8 c.c. was found to be too large. In all, twenty-four patients were treated without any mortality. After injection, the patients experienced more or less reaction in the form of chills, rise of temperature followed by a fall with sweating, the temperature at times becoming subnormal. The patients can be divided into four groups: (1) those who make an uneventful recovery; (2) those in whom the temperature rises moderately and comes down by lysis in a few days; (3) those in whom, after a rather sharp rise of temperature, there is a decided improvement; and (4) those who remain uninfluenced.

The different results are probably due to the idiosyncrasies of the patients. It can not be definitely determined whether a revaccination helps after the primary vaccination has failed. In some cases typhoid can be aborted by means of Ichikawa's vaccine before the dangerous complications develop; the first week presents the best time for successful treatment. Cases that have been aborted and recur usually respond a second time to the abortive treatment.

Figiuoli⁹ has been treating typhoid systematically of late with a vaccine prepared by Vincent's technique, injecting into a vein from 150,000,000 to 300,000,000 killed germs. Larger doses than this are liable to bring on collapse. The details of a few cases are related to demonstrate the advantages of this treatment. He says that the injection is followed by an intense and prolonged chill, the temperature runs up to 104° F. or more, and there is often vomiting, with or without delirium, while the pulse and respiration grow faster. Heart tonics should be given as needed. The fever subsides in a few hours, almost always within twenty-four hours, with sweating, and this defervescence is almost always final. The general improvement is marked and the typhoid bacilli disappear from the stools. The charts

(8) *Wien. klin. Wochenschr.*, Jan. 28, 1915.

(9) *Rif. med.*, vol. 32, No. 13.

show this sudden drop in temperature. The injection was made at the twelfth or fourteenth day in the three cases described. There was one relapse among the twelve patients given this vaccine treatment; it developed on the ninth day after defervescence, but subsided promptly after injection of half the usual dose of vaccine. A single intravenous injection seems to be equivalent to three or four subcutaneous injections, and the latter are by no means always exempt from by-effects.

Study of Immunity Following Use of Typhoid Vaccines and Serobacterins. W. E. Richard Schottstaedt¹ says that in order to gain more information regarding the immunizing value of the various sensitized and non-sensitized typhoid vaccines in use at the present time, a series of experiments on rabbits was undertaken. Following the inoculation with such vaccines, blood was withdrawn at regular intervals, and estimations of the opsonic index and the agglutinating and bactericidal powers were made. He finds that there is a slight reaction following the injection of non-sensitized vaccines in rabbits, which is absent following the injection of sensitized vaccines. Vaccines killed by heat seem to be less active than those killed by the addition of phenol only. Washing the vaccines does not seem especially to influence their immunizing value. The height of the immunity curves occurs earlier after sensitized than non-sensitized vaccines, but the former appear to be only about one-fourth as potent. The agglutinins disappear within three months after the first injection, while bactericidins and opsonins can be detected much longer. Opsonins increase more quickly than do agglutinins and bactericidins. Opsonins and bactericidins remain more permanent than agglutinins, and immunity is more likely due to the former than the agglutinins. Sensitized typhoid vaccines are less potent than non-sensitized typhoid vaccines, probably because the bacteria of sensitized vaccines undergo phagocytosis and bacteriolysis more rapidly. In conclusion he states that in conditions in which a prolonged reaction is desired, as in conferring immunity, the non-sensitized vaccines seem preferable. In conditions in which no general reaction is wanted and

(1) Jour. Amer. Med. Ass'n., Nov. 13, 1915.

a quick response of the protective powers is desired, as in active typhoid fever, a sensitized vaccine would seem preferable.

Treatment of Typhoid With Mouse Typhoid Vaccine. Zupnik² and his co-workers gave vaccine therapy an extensive trial in 145 cases of various infectious diseases, including 112 typhoid cases. The curative results were meager by subcutaneous injection, but the results, they relate, were very encouraging when the vaccines were injected repeatedly in small amounts. It was found that a vaccine made from mouse typhoid bacilli seemed to influence clinical typhoid as effectually as the specific vaccine, while it did not cause such severe by-effects as seem to be inseparable from the latter in intravenous injection. The chill is brief and slight and the symptoms on the part of the heart, the dyspnea, cyanosis and acceleration of the pulse are materially milder, not causing grounds for alarm. This method of treatment was applied without discrimination in all cases, even the very severe, except in those patients with bad hearts to begin with. The only death that occurred in connection with the vaccine therapy was that of a young man with typhoid in such a severe form that the vaccine was apparently the last resort, although the heart was known to be defective. In this case a chill lasting half an hour followed the intravenous injection of 0.5 c.c. of the mouse typhoid vaccine, representing twelve million germs. The pulse ran up and about three hours after the injection there was extremely intense delirium for an hour and a quarter and then five brief convulsions, with death the sixth hour after the injection, about the eighth day of typhoid. In three other cases delirium developed after the injection, mild in two, but severe and persistent in the third. These delirious patients had to be held down in bed by force. The mouse typhoid vaccine induces production of antibodies; the therapeutic dose ranges from eight to twenty million germs. A tentative preliminary injection of four millions will reveal any special susceptibility. If this is borne well, forty-eight hours later the therapeutic dose of eight millions is given. The response of the fever

(2) *Wien. klin. Wochenschr.*, Jan. 13, 1916.

to any vaccine is less pronounced in malaria and relapsing fever, and in exceptionally severe typhoid. The vaccine seems to influence favorably the whole disease process, but the mechanism for this is still a mystery. The vaccines that may be used in typhoid can be classed as those of the typhoid, colon and dysentery bacilli type, and the mouse typhoid and meningococci type.

Present Status of Tuberculin Therapy. Shively^s believes in tuberculin therapy. He says that for the production of good results from the action of tuberculin, it is necessary that there should not be too great a depression of the normal physiologic functions. Patients with severe mixed infection or with grave complications, such as diabetes or nephritis, cases of acute miliary tuberculosis, and rapidly advancing cases of pulmonary tuberculosis with areas of softening and recent cavities, can not be expected to react favorably to tuberculin. Also many incipient cases do sufficiently well with the ordinary dietetic and hygienic treatment, with the medical supervision and regulation of their mode of life, which can usually be best obtained in a well-conducted sanatorium. The special field for tuberculin is that large group of patients with fairly good resistance, with little or no fever, stationary or slowly progressive, who are ineligible for, or can not go to the sanatorium, or who have failed to attain a cure or arrest of their disease while at the sanatorium. Shively believes the time has arrived when every tuberculosis clinic at least should have its tuberculin class. Any well-trained physician who is capable of administering vaccines or diphtheria antitoxin is also competent, with the exercise of good judgment and the necessary patience, to give the tuberculin treatment. The problems in tuberculin therapy are essentially clinical and not of the laboratory, and the physician's best guide is a carefully recorded observation of his patient's temperature, pulse, weight, and general condition. Many physicians are too busy, some are too impatient, others perhaps are too lazy properly to administer tuberculin treatment. These men should not attempt it.

(8) New York Med. Jour., Jan. 8, 1916.

Tuberculin Therapy: Its Principles, Limitations, and Indications. W. C. Klotz⁴ says that on a pathologic basis our knowledge of tuberculin is limited to the phenomenon of the focal reaction, which is the essential feature of the tuberculin reaction. The basis for indications and contra-indications for tuberculin therapy is an estimation of the degree of reactivity of the tissues at the site of the tuberculous lesions. This can be determined only by a careful clinical study of each case. The principal object of tuberculin therapy is to establish tuberculin tolerance, which is not permanent, and the protection offered by it is limited. The various biologic tests are too variable to serve as safe guides for doses in tuberculin therapy. The dose is not and can not be absolute, but must be determined for each individual case, according to the clinical picture.

Tuberculin Therapy: Its Present Imperfections and Future Improvements. F. M. Pottenger⁵ declares that tuberculin has been in use for nearly a quarter of a century; yet there are no definite, generally accepted ideas about it. This is partly due to misunderstanding of this agent and of what is to be expected of it, too much having been demanded; in order to understand the action of tubercle vaccines, their specific immunizing and specific stimulating properties must both be borne in mind. They are made up of many substances, such as proteins, fats, and toxins, which produce specific antibodies, and which, when administered in the proper proportions, produce, it is believed, more or less immunity against the tubercle bacillus; and many of these substances produce a specific stimulation of the foci of infection. While its most ardent supporters admit that tuberculin is far from a perfect remedy, if anyone will watch the clinical results of those who use it most successfully, he must see that sufficient unquestioned results have been obtained to show that tuberculin does have value in the healing of tuberculosis. The solution of the problems of immunization against and the cure of tuberculosis in human beings is the province of the clinician, and he must be careful not to be misled by

(4) Calif. State Jour. Med., July, 1916.

(5) Med. Record, Feb. 29, 1915.

depending wholly on the laboratory. The best results should be obtained by a union of forces between clinician and laboratory worker, both studying and working together. One important point which offers hope for the future is that we now know that vaccines contain many substances which help to build up a complete immunity, and, further, that different preparations contain these in varying quantity. It is the duty of the laboratory to produce and of the clinician to test these various constituents. Especially should the clinician observe more carefully than he has in the past; he has been over-awed and overshadowed by the laboratory, and has thus failed to make the progress he should.

Use of Tuberculin in General Practice. J. L. Bogle⁶ reviews the general principles of tuberculin administration and calls attention to certain errors that are to be avoided. It is necessary to remember in passing from one dilution to another the strength is ten times greater, so that in changing from a smaller injection of greater strength the increases should be small. Again, dilutions newly made are stronger than old dilutions, and the extractive toxin tuberculin dilutions are less stable than those made from the ground bacillary bodies, such as T. R. It is desirable to make fresh dilutions every two or three weeks in the former case, and every four or six weeks in the latter. A nervous patient, tending to high temperatures or hemorrhage, requires smaller doses and of a slowly acting preparation, such as B. E., and hence the course will be lengthened. Although experts, with their knowledge and wide experience, may be able to use tuberculin in most cases of tuberculosis with benefit and without injury, there are cases, Bogle says, in which the general practitioner would do well to avoid the use of this remedy. In mixed infections, catarrhal or bronchial, in tuberculosis complicated by disease of the heart or kidneys, in rapidly advancing or extensive disease, in cases of high fever and quick pulse, in anemia associated with little power of resistance, in those in whom there is a strong hemorrhagic tendency, and in cases of infantile tuberculosis tuberculin as a rule does no good. It is only in conjunction with rational general treatment that

(6) *Lancet*, July 8, 1916.

the striking results of this special treatment are manifest.

Tuberculin Not Dangerous in Hands of Experts. The question defended by Wilkinson⁷ is that, in the hands of experts, tuberculin is not only free from the dangers which have been associated too lightly and erroneously with its administration, but is at once a valuable aid in diagnosis and an invaluable and indispensable remedy in treatment. He does not contend that it is the *ne plus ultra*, but the irresistible evidence of an experience extending over five years in hundreds of cases of tuberculosis of all forms and in all stages, leaves not the smallest doubt in his mind that an independent and impartial inquiry would disabuse the medical mind of the imaginary evils alleged to arise from its use. Such an inquiry would, in his opinion, dispel many of the errors still hindering a solution of a difficult problem, which has not yet been approached and analyzed in accordance with the rules of logic and science, and would be the first step toward the general exploitation of tuberculin as a valuable diagnostic agent in doubtful cases of tuberculosis and as an invaluable remedy in a disease which is so widespread and so difficult to treat with success that no useful remedy should be left untried.

Tubercle Bacilli Not Driven into Blood by Tuberculin. Moewes⁸ examined repeatedly the blood of thirty tuberculous patients under tuberculin but found no evidence that the tubercle bacilli had been mobilized by the treatment. None was found in the blood of those who had been taking the tuberculin for some time and only twice after a provocative injection, at the height of the reaction or at necropsy several days later. The blood was tested for the bacilli by injection of animals. The findings were thus positive in 6.6 per cent. under tuberculin. In forty other cases in which no tuberculin had been given, tubercle bacilli were found in the blood in 5 per cent. of the cases. These figures do not include ten cases of miliary tuberculosis in which the bacilli were found in the blood in 50 per cent. Tests of thirty-three tuberculous guinea-pigs showed tubercle bacilli in the blood in 64 per cent. of the fourteen not given tuber-

(7) Practitioner, October, 1915.

(8) Deutsch. med. Wochenschr., Nov. 11, 1915.

culin and in 68 per cent. of the fifteen with tuberculin.

The Focal Reaction to Tuberculin. Long ago Litzner⁹ called attention to the fact that persons with an unstable nervous system, especially girls, are liable to react with higher temperature to an injection of tuberculin or even to a sham injection. A febrile reaction to tuberculin is thus not necessarily a sign of tuberculosis. On the other hand, with actual tuberculosis there may be a pronounced focal without a general reaction. This possibility should warn against ambulant tuberculin treatment. Hence, the focal reaction is the one of paramount importance, and he has found that it could be detected and estimated best by the change in the bronchophony, or, to use what he considers a more exact term, bronchology. The serous infiltration and hyperemia of the focus from the reaction localized in the focus provide better conditions for the transmission of the whispering voice. Before applying the tuberculin test he examines conditions as to bronchophony and then again after the test, as also each time after giving the tuberculin in a course of treatment. As the patient whispers sibilant numbers auscultation reveals the focal reaction when possibly nothing else could have permitted its detection. This sign has never failed him in the years he has been watching for it, and he urges others to try it and endorse it if their experience confirms his.

Rosenbach's Tuberculin in Genito-urinary Tuberculosis. As the result of an experience of thirteen cases in which this modified tuberculin was given, A. Hyman¹ was able to observe some improvement in only two. The others were wholly unimproved, and some of these even developed additional foci of tuberculosis while under treatment. The very long period consumed in the treatment with the tuberculin may of itself have been the cause of the improvement in the two cases.

Tuberculins and Vaccines. E. H. Coleman,² writing from the general practitioner's point of view, says that in deciding whether or not to use a vaccine, cases may roughly be divided into four groups:

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- (9) Münch. med. Wochenschr., Aug. 10, 1915.
 - (1) Jour. Amer. Med. Ass'n., April 29, 1916.
 - (2) Brit. Med. Jour., July 8, 1916.

1. Those in which a vaccine is usually successful and much more likely to succeed than other remedies.

2. Those in which ordinary remedies have so far failed and we know that a vaccine may cure, though not so frequently as in the first group.

3. Cases of serious disease, in which the use of a vaccine can do no harm, and may decidedly increase the patient's chance of recovery.

4. Cases in which, though vaccines often fail, yet other remedies do so almost invariably.

Among the conditions belonging to the first group are recurring boils and carbuncles, chronic nasal and post-nasal catarrh when due to the pneumococcus, chronic tracheitis of old people, cystitis due to infection of the bladder by *B. coli* and chronic gleet; in all of these autogenous vaccines rarely fail. Under Group 4, the writer discusses rheumatoid arthritis, and says that the most promising cases are those due to septic absorption from the pus about the teeth in pyorrhea. The vaccine should be prepared from this pus. His experience with cases of this class has not been very hopeful and he feels inclined to believe that the difficulty is due to the dense tissues and poor vascular supply of the parts which are affected in this disease. In chronic suppuration of the middle ear he has also found the vaccines to fail. In discussing the use of tuberculins, Coleman brings up the matter of mixed infections and says that most failures of tuberculin are due to this not being recognized. He has had some of his best results by combining Dr. Curle's nascent iodine treatment with B. E. He believes the iodine acts on the adventitious infection, and the B. E. then has a fair chance with its own bacillus. He has also seen good results from the use of a vaccine made from the adventitious organism along with tuberculin. Another point which is emphasized is that in treating a patient with tuberculin the sputum becomes less infective, the tubercle bacilli often completely vanishing, even though from the symptoms and physical signs it is evident that the disease still has a strong hold. This is of value in preventing spread of infection. Coleman has never known harm to follow use of tuberculin in hemoptysis provided it be properly employed.

PART III.

ELECTRICITY, ROENTGEN RAYS, RADIUM, RADIO-ACTIVE SUBSTANCES, AND HELIO THERAPY.

ELECTRICITY.

Influence of Electricity on Metabolism. Elaborate experiments carried out on the writer, M. Steel,¹ in the chemical laboratory of Long Island College Hospital, showed that a stimulation of metabolic processes always followed electrical treatment. The volume of urine is increased by currents which do not have a pronounced thermic effect and is decreased by currents which have a strong thermic effect, while all the currents increase the quantity of solids in the urine. Urea was increased most markedly by the static wave current, while the greatest increase of creatinin occurred with the faradic sinusoidal current.

Electricity in Goiter. This author, E. Myers,² holds that about 95 per cent. of all forms of goiter are liable to benefit from proper electrical treatment. For hypothyroidism, he recommends cataphoresis with potassium iodide. This should be applied with a small felt electrode wet with from 15 to 20 drops of a saturated solution of the iodide and connected to the negative pole of the battery. From three to ten milliamperes should be used, introduced gradually, and about ten minutes' application should be made to each of the lateral lobes, and to the isthmus at each sitting. The sittings should be repeated weekly. He states that 100 per cent. of cases of hypothyroidism are curable by this treatment. Hyperthyroidism is best treated, he declares, electrically by exposure to properly gauged doses of x-rays. In

(1) Med. Record, March 11, 1916.
(2) Northwest Med., January, 1916.

some cases in which the response to radiation of the thyroid alone is not satisfactory, the ovaries should also be exposed, since they often share in the general disturbance.

Electric Light in Treatment of Wounds. E. Schottelius³ uses an ordinary incandescent electric light bulb and exposes the wound to it several times a day to a total of eight or nine hours. The immediate local effect, he says, is as striking as the general effect from day to day later. Paper and a sheet are thrown over the whole and the temperature of the enclosed space grows high, but he ascribes the benefit to the light rather than to the heat. The bulbs were of 30, 50, or 100 candle power.

The Simpson Light in Venereal Lesions. E. G. French⁴ reports satisfactory experiences with this new treatment in the promotion of healing in various types of syphilitic lesions. Brief exposure, usually for two minutes, varying between the open light and the focal rays, should be given three times weekly, care being taken at the inception of treatment not to over-expose the tissues, since a severe reaction may delay healing. Ordinary general antisiphilitic measures should be employed in conjunction with the light, except that no other form of local treatment should be given. The wound should be lightly covered with gauze over a wire frame in the intervals between exposures. Many refractory cases were cured promptly with the aid of the light, and the most characteristic feature of its use other than the prompt healing, was the absence of marked scarring.

Treatment of Septic Wounds With the Simpson Light. After the use of the Simpson light for over seven months, J. A. Menzies⁵ considers a report of his favorable results opportune at this time. He has seen great improvement following such treatment in three cases of lupus; one case of eighteen years' standing was entirely healed, and in two cases of advanced Graves' disease the thyroid gland became smaller and the signs and symptoms decreased. He cites also the results in cases of wounds of the elbow, thigh, knee-joint, and leg

(3) Münch. med. Wochenschr., June 29 1915.

(4) Lancet, Jan. 29, 1916.

(5) Lancet, March 4, 1916.

in soldiers which were cured. Over forty patients were treated. The dose given was two and a half to three minutes at each sitting, and there were usually two sittings a week. The following may be regarded as among the distinctive features of Simpson light treatment:

1. The relief of pain, which often followed on the day after the first application.

2. The increase of movement, also following shortly after the first treatment, but this does not apply to wounded joints.

3. The relief of swelling; tenderness, and inflammatory induration were markedly reduced.

4. Absorption of scar tissue; this was shown by the results on old scars on the cornea, which cleared up.

5. Improved appearance in wound tissue, in which unhealthy granulation tissue became healthy.

6. Diminished discharge from the wound, a very marked feature.

Treatment of Septic Wounds by the Electrolytic Bath. F. Fowler⁶ took up what seemed to be a fantastic idea. The answer to the question of how to attack germs in the tissues has been sought in the use of antiseptic lotions, vaccines, or serums. The discovery of Russ that nearly all germs are carried toward the positive pole of an electric current passing through a solution of sodium chloride, and that the small current required is fatal to the germs was seized upon by the author to answer the question, how can the germs in the tissues be induced to leave the deep parts, if we can not kill them without also killing the tissues? The practical results of the treatment instituted by the author seem to support Russ' observations. The electrode connected with the positive pole of the battery is immersed in the bath with the wounded limb. The negative pole must be connected to some indifferent part of the body either through another bath or a moist pad. A current of 20 to 30 milliamperes, which the patient should barely feel, is sufficient for an ordinary bullet wound.

Injurious Action of Ultraviolet Radiation. Burge⁷ claims that the ultraviolet radiation kills living cells and

(6) Brit. Med. Jour., Sept. 18, 1915.
(7) Amer. Jour. Physiol., January, 1916.

tissues by changing the protoplasm of the cells in such a way that certain salts can combine with the protoplasm to form an insoluble compound or coagulum. The effective region of the spectrum in changing the living material of the cell or protoplasm lies between 254 microns and 302 microns. The most effective region is around 254 microns for the small quartz mercury burner used, and around 302 microns for the large quartz mercury burner used. An opacity of the lens or cataract can be produced in fish living in solutions of those salts found to be greatly increased in human cataractous lenses by exposing the eye of the fish to radiation from a quartz mercury-vapor burner. This can not be done by exposing the eyes of fish living in tap water containing small quantities of these salts. Abnormal quantities of the salts of calcium and sodium silicate in the cells of the eyelids and of the cornea increase the effectiveness of ultraviolet radiation in producing anterior eye trouble. Abnormal quantities of calcium salts on the skin also increase the effectiveness of the short wave lengths in sunlight in producing sunburn.

Destruction of Limited Obstructive Glandular Growths in the Posterior Urethra by the High-Frequency Current. R. V. Day^s reports several cases occurring in the private practice of Dr. Granville MacGowan and himself. Out of thirty-nine cases of intra-urethral or bladder neck cautery operations during the past thirteen months, thirty-one were done by either the simple electric cautery or high-frequency cauterization with flexible electrodes; eight were done by the silica insulated wire needling and bipolar current. Only selected cases were chosen for this method. Among the eight cases detailed there were two failures and six successful operations. In conclusion he states that a much greater amount of tissue can be cooked at a sitting than by ordinary high-frequency methods; the point of application can be made to better advantage in some cases—especially when the urethra is somewhat choked; masses can be made to slough which could hardly be impressed by the usual procedures; and there is little fear of even slight hemorrhage and very little post-operative reaction.

(8) Jour. Amer. Med. Ass'n., Nov. 20, 1915.

Continuous Electric Light Treatment in Arthritis.

Simmonds and Moore,⁹ after referring to the fact that a patient with "rheumatic" pains and joints is often relieved by the use of incandescent bulbs with a metal reflector or by a general electric light bath, state that they have been able to demonstrate the beneficial effects in a direct, experimental way. Rabbits in which arthritis had been induced by intravenous injection of living hemolytic streptococci were in part treated by means of electric globes continuously suspended in their cages, and these recovered more rapidly than the controls not so treated. The development of arthritis was either prevented, or the condition rendered much milder in animals treated with the continuous electric light than in the untreated controls. The changes in weight of the animals and the average febrile temperatures in the two groups of animals also attested the favorable influence of the treatment.

Electrical Treatment of Nerve Injuries. Larat and Lehmann¹ analyze the 1,500 cases of nerve injury and associated paralysis with which they have had to deal at the Val-de-Grace military hospital in Paris since October, 1914. They classify the paralyses in the order of frequency as follows: Radial 27 per cent., median and cubital each 18 per cent., external popliteal 14 per cent., circumflex of brachial plexus 9 per cent., sciatic or internal popliteal 7 per cent., superior radicular of brachial plexus 2 per cent., facial 2 per cent. The radial paralyses are generally unassociated, though at times they coincide with paralyses of the circumflex. Those of the median and the cubital are often associated; the radial-cubital association is more rare. Clinical signs of nerve degeneration resulting from wounds in war are of the usual variety; motor disturbances, which are predominant, and of insidious onset, include paralysis of the injured territory, with diminution or abolition of the corresponding tendinous and cutaneous reflexes; sensory disturbances include anesthesia or paraesthesia, pain of variable character, and sensations of superficial tingling; there are also trophic disturbances, such as muscular

(9) Arch. Int. Med., January, 1916.
(1) Paris méd., June 26, 1916.

atrophy, and a peculiar appearance of the skin, which becomes tender, thin and bright.

The authors leave the delicate details of electrodiagnosis for more elaborate discussion, and confine themselves to the subject of treatment. The therapeutic purposes are of three descriptions: (1) To lessen the pain, if this exists; (2) to stay the degeneration of the muscular fiber in the territory of the wounded nerve; (3) to assist in the recovery of the nerve.

For lessening pain the galvanic current is indicated. The ascending current should be used; that is to say, the positive should be placed at the extremities, while the negative is disposed toward the nerve root. The intensity may vary from 5 to 15 milliamperes. Whenever possible, the ordinary galvanic application should give place to diathermia. A very large electrode is applied to the spine at the point of emergence of the nerve, and another envelops the extremity of the member. The intensity is from 300 to 1,000 milliamperes, according to the tolerance of the subject; the duration of the sitting is from fifteen to twenty minutes.

As to the second therapeutic indication, all electrotherapeutists are agreed in limiting the employment of the faradic current to cases in which there is no neuromuscular degeneration, but relative anatomic integrity of the tissue. The indications for faradization are recognized in abarticular paresis, and in paresis or paralysis which is purely functional or follows upon a severe contusion. Beyond these cases, and when the nerve itself is attacked, it is always to the galvanic current that one should have recourse.

As to the third indication, which is fulfilled at the same time and by the same procedure as the muscular excitation, the authors raise the question as to the way in which the current may act in the regeneration of a sutured nerve. Their own cases are too recent for a useful comparison to be made with those which have had no electrical treatment, but *a priori*, the utility of electrization would seem indicated by its undoubted efficacy in ordinary peripheral neuritis. As traumatic degenerations do not differ anatomically from ordinary neuritis, the authors conclude that the traumatized nerve recovers

more quickly and thoroughly if it is submitted to methodical electrization. As to the duration of treatment, if the nerve degeneration is to be cured, the process may occupy, in the slighter and more favorable cases, three or four months, and in average cases eight or twelve months.

Inoperable Malignant Growths Treated by Diathermia. E. P. Cumberbatch² reports sixty-one cases of malignant growths treated by diathermia. They were all surgically impossible, some of them so extensive that the whole of the growth could not be destroyed without damage to the outlying important structures. In some of the cases of malignant growth of the pharynx and mouth treated by diathermia, the patients did not suffer from shock and were able to get up after forty-eight hours and to swallow without any discomfort at the end of this time. They usually remained in the hospital for about six days. They were greatly improved in their general health and the disagreeable symptoms, such as constant discharge, expectoration, and difficult swallowing, were relieved. Cases in this region that were not favorably influenced were those in which the growth had penetrated into the neck or had invaded the bone. Three patients with malignant growths obstructing the esophagus were relieved of their difficulty in swallowing under this treatment and a similar number of cases of malignant growth of the tongue also showed great improvement in a very short period of time. In carcinomata of the female genitalia this treatment has been used with considerable success, and as preliminary treatment to the Wertheim operation for operable carcinoma of the cervix, it is preferable, Cumberbatch declares, to the application of zinc chloride or formaline. Other regions included in the series in which it exerted a favorable influence are the lip, cheek, breast, bladder, and skin.

Application of Diathermia to the Cervical Vertebrae. Good results from the application of diathermia to the cervical vertebrae were obtained by A. E. Scherbak³ in cases of circulatory disturbances of the brain, organic as well as functional. In a case of severe headache which

(2) Arch. Roentgen Ray, March, 1915.

(3) Roussek. Vrach., Jan. 2, 1916.

accompanied right-sided hemiparesis, hemianopsia with atrophic changes in the eye-grounds and loss of hearing, from twelve to fifteen applications relieved the headache—the only troublesome symptom. In a case of cerebral syphilis, ten applications relieved the headache, hyperemia, and the noise in the ears, and restored the patient to working capacity. It is interesting that the Argyll-Robertson sign, which was present, disappeared after the treatment. Equally good results were obtained in fifteen cases of functional disorders accompanied by circulatory disturbances in the head. In the majority of cases the blood-pressure, when above normal, was lowered after each treatment and remained so after a number of applications. The method of application consisted in the use of two electrodes with a combined area of 57.5 square cm. The upper electrode was applied to the upper cervical vertebra and the lower to the middle dorsal. From 0.5 to 0.7 ampere was employed, each treatment lasting five to six minutes. The author cautions against prolonged treatment in view of the marked circulatory changes produced in the cerebral circulation, and mentions anemia of the brain, low blood-pressure and excitement as contra-indications.

Phototherapy in Psoriasis. Linser⁴ refers to the excellent results from direct sunlight in treatment of psoriasis that have been reported from mountain health resorts. He began applying this treatment in 1911 and obtained unmistakably favorable effects, but as the sunlight in Tübingen is so undependable he soon supplemented it with the "artificial mountain sun," the mercury vapor light. His experience with over 100 cases of psoriasis in the last two years has amply confirmed the value of this method of treatment as one of the most successful at our disposal. No untoward by-effects were ever detected, and the patients prefer the artificial ultra-violet rays technique to all other measures. Petrolatum and warm baths were the only adjuvants used. The aim is to induce a distinct inflammatory reaction in the patches of psoriasis. If the environment shares in the reaction, this does no harm. The most favorable reaction is when slight serous exudation occurs. Blistering does

(4) *Med. Klinik*, July 4, 1915.

no harm, but is more painful and takes longer to heal. When the phototherapy is applied so cautiously that there is no pronounced reaction, the treatment fails to modify the psoriasis. In unusually rebellious cases the Roentgen rays may be preferable. The psoriasis has returned in some of the patients, but in a milder form and with a longer interval of freedom than previously under other measures. In short, Linser regards heliotherapy, natural or artificial, as essential progress in the management of psoriasis.

ROENTGEN RAYS.

Radiotherapy of Spastic Affections of the Spinal Cord After Gunshot or Shell Wound. Bonnus⁵ here reports eleven cases. The best results were obtained in spastic hemiplegia from injury of the cord in the neck, but some benefit was realized in nearly every case. The interval since the injury ranged from two to ten or eleven months, and the spastic phenomena had shown no signs of retrogression for many weeks. The benefit was apparent even after the first sitting. As the spastic phenomena subsided, the pain from the inflammation of the roots also became less or ceased entirely. The exposures were usually made once a week, to a total of six to nine. The dose was 1 or 1.5 H at the point of lesion.

Influence of Filtered Roentgen Rays on Skin Diseases. The advantages of this mode of treatment are summed up by Meyer⁶ as follows:

In many diseases results are more prompt and certain than with other methods, and this is especially the case with chronic affections, while the damage done to the skin is trivial, because it becomes somewhat more sensitive to the rays. Dermatoses which have been pronounced incurable have been cured by this method. The chance of a reaction with filtered rays is small, and when reactions follow radiation, they pursue a mild course. Since large x-ray tubes are required when filtered rays are used, a correspondingly large surface of integument

(5) Paris méd., Jan. 1, 1915.

(6) Berlin klin. Wochenschr., Oct. 13, 1915.

can be rayed at one time. The possibility of a stronger charge makes it possible to reach the intended dose in shorter time. The pains and time required for protection against unfiltered rays are greatly diminished. Finally, there is no longer—with filtered rays—any necessary distinction between superficial and deep radiation.

Roentgen-Ray Treatment of Skin Diseases. Inasmuch, H. H. Hazen⁷ writes, as the modern method is to give one, two or three large doses carefully measured, there is no stimulation, action is rapid, and no chronic dermatitis is produced. A hard tube is preferred to a soft one, as there is less danger of skin irritation. The skin conditions most benefited by *x*-rays are thick patches of squamous eczema, acne vulgaris, lupus vulgaris, tinea tonsurans, lichen planus, common warts, keloids, and cancer. It is doubtful, he says, if radium can produce any effects that the *x*-ray can not equal.

Roentgen-Ray Treatment of Ringworm of Scalp. MacKee⁸ states that the use of the Roentgen ray in tinea tonsurans is based on its ability to cause a defluvium—to make the hair fall out. The ray does not have a destructive effect on the fungus, although it is possible that in some way it so modifies the soil that the organism finds a less favorable medium on which to grow. In any event, most of the spores are removed with the hair and those remaining disappear or are destroyed by the use of antiparasitic remedies before the hair regrows, at the end of about three months. In general there are two ways in which the Roentgen ray can be employed for this purpose—namely, the divided dose and the massive or intensive dose methods. With very few exceptions the former is the procedure used in this country, while in Europe the latter method has been employed since it was advocated by Sabouraud and Noire in 1904.

The older method (divided dose) precludes accurate direct measurements and can not be employed to produce a defluvium of the entire scalp, at least not without considerable danger. Its use, therefore, is limited to the individual treatment of one or more areas. Even here the result is uncertain and unsatisfactory. With the

(7) Interstate Med. Jour., April, 1916.
(8) Med. Record, Aug. 7, 1915.

older technique, permanent alopecia may occur even in the absence of a preceding erythema. On the other hand, if this amount is divided into eight treatments which are administered twice weekly, depilation will not result. The details of the method as employed by the author are described.

Röntgen-Ray Treatment of Acne. Dosseker⁹ says that experience is demonstrating that repeated small doses of the rays, not strong enough to induce appreciable reaction in the skin, or a single large dose with a reaction, seem to be able to modify the epidermis, that is, the sebaceous glands, to such an extent that the tendency to acne dies out. His communication is based on large numbers of cases, but he does not cite statistics nor bibliographic references, his aim being merely to recall attention to Röntgen treatment of acne, with his personal endorsement of it. Fortunately, he adds, its efficacy is greater in acne spread over a larger surface, with numerous pustules, than in the less disfiguring, torpid type.

Radiotherapy of Gynecologic Disease. Kower¹ lauds the efforts to cure malignant disease with radiant energy, as a new and promising field for effectual work. But he warns impressively against extending this treatment to gynecology without full recognition of its dangers. Its efficacy rests on the basis of destruction of the essential elements of the ovaries; that is, it induces an artificial castration. Some claim that the amount of destruction can be graduated, and that it is possible to attain the desired end without actually killing the essential element of the ovary, but Kower says that these men do not know what they are talking about. Our knowledge of the structure and functioning of the ovary is still rudimentary. The castration induced by radiotherapy goes counter to the lessons of experience, and he denounces the whole system of radiotherapy of the internal female organs unless they have outlived all functional usefulness. He says that institutes for radiotherapy are springing up all over the land and the mails are flooded with prospectuses advocating radiant energy

(9) Therap. Monats., August, 1915.

(1) Nederl. Tijdschr. v. Geneesk., Aug. 23, 1915.

in treatment of gynecologic affections, without a hint of the inherent dangers.

Treatment of Venereal Buboës With X-Rays. Kull¹ states that the chancroid is a mild affection *per se* and is only to be feared as a possible cause of bubo. The original treatment of the latter was poulticing followed by incision, this being ultimately followed by free incision and curettage, or extirpation of the lymph nodes. There is a closed or semi-closed treatment of these buboës which agrees with that for suppurating tuberculous lymph nodes. Owing to the power of the *x*-rays over the latter, Kull made a test of them in chancroidal bubo. He applied these both before and after suppuration. In cases of the former class, the action of the rays is startling. The pain at once ceases and the nodes soon resume their normal size. These results may come about after one radiation, the patient being practically well within forty-eight hours. If the bubo has not become a great abscess the rays are able to destroy the leukocytes, which are probably absorbed. All signs of inflammation cease and the indurated infiltration is slowly absorbed. When an abscess has formed it should be evacuated by puncture, after which it will yield to the rays. Syphilitic buboës promptly subside under the rays. These results are only what should be expected, the author says, when we consider the power of the rays over tuberculous lymph nodes and lymphoma.

Inhibitive Effect of X-Rays on Malignant Cells. In discussing the action of *x*-rays on the morbid cells of an epitheliomatous area, Kempster² states that while the action of *x*-rays is such that any cell, whether malignant or non-malignant, young or old, can be completely destroyed, and in such order that the young cell is selected for destruction in preference to the old cell, and the malignant cell in preference to the healthy cell, yet in order to cause the disappearance of a new growth it is quite unnecessary to destroy a single cell. There is another influence which can be brought to bear and which is in the end more efficient and safer to the healthy tissues—this is the influence of inhibition of the power

(2) Münch. med. Wochenschr., Oct. 19, 1915.

(3) Arch. Radiol. and Elect., No. 179, 1915.

of division and subdivision of the cells; in other words, inhibition of proliferation, for there appears to be at this period of the life history of the cell a greater susceptibility to the effect of *x*-rays, resulting in its power of proliferation being checked or delayed. The quantity of irradiation required to accomplish this is not sufficient actually to kill the cells themselves, but is capable of destroying their power of reproduction.

X-Ray Treatment of Fungating Epithelioma. C. Kempster⁴ states that during the past few years he has been able to treat a large number of malignant growths and to observe the effect of various methods of filtration upon this particular form of growth. He finds that those cases which gave the best results in his hands were the ones treated by what is termed the "progressive filtration" method—that is, the gradual introduction of filters of progressive thickness. It is his custom to deliver to cauliflower fungations a full pastille dose of the rays without any filter whatever at a distance of 10.6 cm. from the anticathode, since the soft short rays from the *x*-ray tube have a singularly rapid atrophic effect when delivered in full pastille doses. This dose is repeated two or three times at weekly intervals. At the end of this time the growths have usually shrunk in a remarkable manner. An aluminum filter 1 mm. in thickness is then introduced at two or three sessions, at weekly intervals, and then successively thicker filters are used. In this way a number of satisfactory results have been obtained. The writer cites illustrative causes.

Combined X-Ray and Radium Treatment of Inoperable Uterine Cancer. Bergonie and Speder⁵ make use of a military analogy in comparing *x*-ray and radium applications in treatment of uterine cancer. The *x*-rays, they say, may be likened to machine guns which, stationed on the crests of hills, concentrate their fire on enemy troops in the hollow, and are able also to rake isolated detachments distributed on the further side of the opposite slopes. Radium, on the other hand, has the effect of bombs exploding in the central positions of the enemy, leaving the outer ring unscathed. The au-

(4) *Lancet*, Oct. 16, 1915.

(5) *Arch. d'elect. méd.*, No. 391, 1915.

thors find that the reaction on the skin after an exposure of five hours to the ultra-penetrating radiation of 18 cg. of radium placed 2 cm. away is about equal to that which follows an *x*-ray irradiation for twenty minutes, the rays being filtered through 3 mm. of aluminum, the antithode placed 20 cm. from the skin, and the current being 3 ma. The *x*-ray intensity, therefore, is about 1,500 times greater than the intensity of the radium. The employment of radium, however, is of considerable value when the neoplastic tissue is of no great thickness, and the extreme penetrability of the radium rays is advantageous from the point of view of homogeneity in the immediate distribution of the effect. The authors recommend a combined method of *x*-ray and radium applications. The *x*-rays are concentrated on the same mass of tissue through a number of converging ports of entry. The anterior inferior abdominal wall is divided into four, six or eight fields (according to the corpulence of the subject and the probable extent of the lesion), and the sacro-iliac region into four or six fields. These fields receive successively an *x*-ray dose of from 15 to 18 Holzknecht units. The rays are filtered through 4 mm. of aluminum, and with these a very large dose may be given without a reaction beyond that of radio-epidermatitis, which requires for its evolution eight days at most. By means of a speculum further radiation is introduced by way of the vagina, the mucosa of which has a remarkable power of resistance to *x*-ray action. This means of irradiation by the vagina, through which a total amount of 50 H units may be given, enables one to act on the prolongation of the neoplasm in the large ligaments and in the walls of neighboring organs. The treatment of the various fields and of the vagina may be spread over a period of ten or fifteen days, followed by another series of sittings at the end of a month. The authors have treated five cases of inoperable uterine cancer or relapses after operation by a combined method consisting of (1) local radium therapy, with 18 cg. of radium bromide, of which only the ultra-penetrating radiation is utilized, the total duration of the applications being 100 to 150 hours; and (2) deep radiotherapy. The cases are too recent to admit of a definite judgment, but in all of them

within two months there has been an improvement locally, and the neoplasm itself, which in two cases had the character of a diffuse infiltration, has become limited to a hard mass. In one case of cancer of the neck of the uterus which was operable, but was treated by radiation because the patient refused surgical intervention, no trace of the trouble has been found for three months, and no induration is perceptible on palpating the uterus.

X-Rays in Carcinoma of the Stomach and Intestine.

The advantage of treatment with *x-ray* is that the area attacked is larger than when radio-active substances are used; when cross fire is employed the tumor can be attacked from all sides. The rays can be applied through the skin or the skin can be dissected back and the rays applied to the muscles or directly to the tumor. The best results were obtained by application to the skin and this is by far most convenient to the patient. Hard tubes are to be preferred. The dose employed has been from 1,775 to 2,400 X administered during a period of several months. As to the combined treatment with *x-ray* and injections of encytol intravenously, Decker and H. von Bomhard⁹ have not had sufficient experience to express a definite opinion. Of the cases in which they employed the combination and those in which the *x-ray* alone was used, the latter showed the best results; and they warn against crediting the injections of encytol with the improvement observed in cases of this class. During the course of the treatment no untoward symptoms were observed except that after repeated applications of the *x-ray* the patients complained of fatigue and the treatment had to be stopped for a few days. The authors conclude, as a result of their work, that the small doses heretofore employed have no result on deep-seated carcinomata; that large doses of hard rays given at short intervals have a good influence on inoperable carcinomata; that there need be no injury to the skin and that inoperable carcinomata of the stomach and intestine should be subjected to this form of treatment.

Röntgen-Ray Treatment of Pulmonary Tuberculosis.

In 1913, Kupferle and Bacmeister reported a series of experiments on rabbits inoculated with tuberculosis and

(9) Münch. med. Wochenschr., Jan. 19, 1915.

systematically exposed to the Roentgen rays. The outcome was decidedly encouraging in many of the animals, and inadequate dosage explained most of the failures. In a later series, they used large doses at shorter intervals, and report remarkable success; the tuberculous process was evidently arrested and healed over, but the tubercle bacilli themselves were not killed. No influence from the mercury-vapor lamp or cholin could be detected. The dosage found effectual for the rabbits was 20 or 23 X surface energy, given at three or five day intervals. The research was done under a subsidy from the Koch foundation. The results were regarded as so promising that roentgenotherapy with hard, filtered rays is now being used in the clinic, and Bacmeister¹⁰ here reports twenty cases of stationary pulmonary tuberculosis, without fever, and with a tendency to latency, in which the treatment was applied; and also a number of febrile and chronically progressive cases.

The course has been completed by ten patients in this latter group, and they are all clinically cured. In every case benefit was manifest; three of these patients had been in his sanatorium (St. Blasien) for fourteen, eight and five months, but the tuberculosis had not mitigated its progressive character until the Roentgen treatment was applied. Great benefit is apparent in a number of the twenty-three others in this group still under treatment. The experimental and clinical data all confirm that the Roentgen rays act only on the relatively rapidly growing tuberculous granulation tissue. Extremely virulent and rapidly destructive processes are not influenced by them, nor cheesy processes nor the tubercle bacilli themselves. The principles for application and the technique are the same as for superficial tuberculous processes. Success depends on proper dosage and intervals, supplemented by outdoor life with graduated exercise and repose. In conclusion he reiterates that the Roentgen treatment is particularly promising, in combination with the mercury lamp treatment, for a lung compressed by induced pneumothorax and after thoracic surgery.

(10) Deutsch. med. Wochenschr., Jan. 27, 1916.

X-Rays and Radium in Enlarged Lymphatic Glands.

Robert Knox¹ states that the principal type of radiation employed in these cases has been a moderately hard x-ray, and when radium was used the gamma ray with a filtration of 3 or 4 mm. of lead or 1 or 2 mm. of platinum when applied over the skin surface. Enlarged glands respond to radiation in the following order: (1) Simple inflammatory glands are quickly influenced by a few exposures; the treatment is not applicable to enlarged glands in which pus formation has commenced; (2) lymphadenomatous glands are less quickly acted upon, but almost invariably diminished in size soon after a number of exposures of hard radiations; (3) tuberculous glands are not readily affected; they require a large number of exposures at short intervals to induce retrogressive changes, but ultimately these also slowly respond to radiation treatment; (4) malignant glands are also influenced; sarcomata respond much more readily than carcinomata. They may disappear but are apt to recur. Carcinomatous glands rarely disappear under treatment, but they may diminish much in size. In enlarged glands due to a mixed infection the response to treatment may be irregular, some glands subsiding rapidly while others respond slowly. The x-ray becomes of value as a means of diagnosis if its effect on the glands is noted. In order to render the method practical it would be necessary to standardize the exposure. In estimating the reaction to radiations the biologic factor is of some importance, and as this is not constant, varying in different individuals and in the same individual at different times, it is a disturbing element in estimation. Drugs such as iron, arsenic and mercury also affect the response to radiations. When a group of enlarged glands has been reduced to a moderate or small size the expediency of operation should be raised. It is probably better to remove the glands thoroughly and, in a number of cases, post-operative treatment is advisable. In malignant enlargement of the lymphatic glands no patient should be treated unless a surgeon has deemed it unwise to operate.

(1) Arch. Radiol. and Elest., June, 1916.

Dangers of Radiotherapy. Gaucher² has been much disappointed with the effects of Roentgen and radium treatment of skin affections and especially of superficial cancer. They do not ward off recurrence and Roentgen ulceration may develop even as long as ten years after the exposures. In a recent case of the kind a young man had had a Roentgen ulcer develop on the back of the hand and wrist—the area had been exposed to the Roentgen rays on account of nevus ten years before. Gaucher has seen radiotherapy cure lupus completely, while he has often seen it induce an epitheliomatous transformation of the lupus. Radium is perhaps less dangerous than the Roentgen rays, but he knows of several cases of ulceration following radium exposures and leaving deforming scars after the ulceration had healed. In a recent case in a man of 60, syphilitic sclerous glossitis and gummas of the tongue ulcerated and soon became transformed into inoperable epitheliomas. Gaucher declares that the Roentgen rays and radium in the treatment of skin affections, and especially in cutaneous cancer, have not given the anticipated results. They should be used with prudence and only in cases in which other modes of treatment are not applicable or have not given results.

RADIUM.

Physiologic Action of Radium. The physiologic action of radium is remarkable, says D. C. Moriarta.³ It often increases the red blood count 250,000 in forty-eight hours, with rapid increase also of the hemoglobin. It stimulates all cell life, increases elimination of carbon dioxide, urea and uric acid. It diminishes the viscosity of the blood and increases the secretion of urine, stimulates the appetite, aids digestion, dilates the blood-vessels and invariably lowers blood-pressure. Cardiovascular cases require small doses, while arthritic cases require large ones. It may be given intravenously or internally and in radioactive waters. Nephritis is greatly benefited

(2) Bull. de l'acad. de méd., July 11, vol. 76, No. 28.
(3) Med. Record, March 4, 1916.

by its use, while both in malignant and benign growths, he asserts, the results are startling.

In a later article the same author⁴ maintains that high blood-pressure may be normal for existing conditions and should then not be interfered with, especially by drugs. The Saratoga waters, Moriarta believes, exert their greatest benefit from their radium content, their use almost invariably causing a drop of from 20 to 60 mm. Hg. in from four to six weeks. Radium causes stimulation of normal cells as well as correction of perverted cell action by influence on the enzymes. The author has treated fifty-six patients in the last year with radium emanation combined with radio-active waters and regulated regime; he has devised a special room for radium inhalation treatments. The radio-active waters are given in doses of 25,000 to 100,000 Mache units a day, in divided doses after meals and at bedtime, while inhalations are given for two hours daily in the "emana-torium" which shows 250 Mache units to the liter of air. In selected cases radium salts are given intravenously and repeated in two weeks.

Radium Therapy. W. B. Chase⁵ reaches the following conclusions:

1. The destructive power of radium on cancer cells is well established.
2. The employment of radium in cancer is not in conflict with surgery, but both possess distinctive fields of usefulness, each having its limitations; they are largely supplemental to each other, and there is ample opportunity for coöperation and reciprocity.
3. Large, operable malignant growths should be removed by the knife.
4. The analgesic power of radium is one of its most precious properties.
5. Want of confidence in radium arises from the use of low grades or spurious products, and from want of knowledge and skill in its application, together with the exaggerated, conflicting, and false reports so constantly current.
6. Post-operative radiation is of great usefulness and

(4) *Med. Record*, May 13, 1916.

(5) *New York Med. Jour.*, Jan. 9, 1915.

rapidly coming into professional use at home and abroad, being commended by prominent authorities, who not long since were unconvinced of its curative and palliative powers.

7. Crossfire application of radium increases its efficacy and aids by its multiple application in securing deeper penetration of large areas than by ordinary methods of application.

8. As in surgery, so in the application of radium, disappointment is likely to follow too optimistic expectations of recovery.

9. In proportion as metastasis is present the chances of cure diminish, and in turn delayed diagnosis is often responsible for metastasis.

Radium Therapeutics. An editorial writer* points out that radium therapeutics should be considered not only from the standpoint of tissue inhibition, but also from that of tissue stimulation. The less penetrating radiations expend their energy upon the tissues in the production of a stimulation action, developing heat and exerting other superficial activating effects at the surface and as far within as the rays will penetrate. They increase thereby the processes of metabolism and elimination, and induce hyperemia with its beneficial effects on the tissues, besides reflexly affecting the spinal centers. The penetrating or gamma rays of radium, on the other hand, produce no thermic effect on the tissues, but exert an intense inhibitory action which, when applied for a considerable time, arrests all active local processes and destroys the tissues. Provided with filters to eliminate the alpha and beta rays, and buried in the midst of the tumor, radium is very effective in large round or giant celled sarcomas. For reaching remote malignant or tuberculous processes, however, the x-rays are far superior.

Internal Therapeutics of Radium. A large number of cases are presented by Samuel Delano,⁷ and it is stated that one important particular distinguishes this series from previous ones, namely, the mode of using the radium—radium emanation.

(6) Amer. Jour. Electrotherap. and Radiol., May, 1916.

(7) Med. Record, July 24, 1915.

Radium emanation may be introduced in several ways, as by injection, by inhalation, by bath, and in solution by drinking; but rarely, however, has it been given conjointly with its source, radium, because this yoking up has not until now been generally available. Among the cases reported are instances of gout, rheumatism, acute and chronic, rheumatoid arthritis, arthritis, neuritis, and neuralgia, and also nephritis and metabolism cases. As to what radium emanation can do, as revealed in this series, Delano finds:

First: It is a diuretic. This appears to be the most constant single effect of radium, being observed in perhaps seven out of ten cases. It would not seem to be ascribable to direct action on the kidney, because radium is not excreted to any extent by the kidney; but rather to general influences, such as systemic effects or changes in the constitution of the urine. Second: It is a laxative—not so often as it is diuretic, but in a good proportion of cases. This does not mean that it procures loose movements, but only what seems ascribable to quickened peristalsis. Third: It is tonic and stimulant. It is remarkable with what consistency one may predict that radium will make a patient look and feel better. It is indisputable that as direct hematinic it will stimulate a pronounced increase of red blood cells and hemoglobin; so that patients with pernicious anemia lose their perniciousness (if we may not speak of cure). The direct effect on the blood, however, is not all, for there appears to be an independent stimulant action. Fourth: Metabolism and nutrition: While the physiologic action of radium may not yet have been as thoroughly studied as it probably will be, there is not much dispute as to its increasing the nitrogenous metabolism. It is stimulating to the innumerable ferments of the body, supplying a goad, so to speak, to the vital processes. A corollary to this would be that it ought to be an equalizer, tending to restore the balance of forces. Fifth: External and topical: Even a weak solution (two micrograms to two ounces) is anodyne. It instantly relieves toothache, and, held in the mouth for a few minutes, a small quantity of such a solution will produce, after some hours, softening of the mucous membrane, swelling and blanching

of the lip, and viscosity of the pharyngeal mucus. In a metropolitan surgical clinic all pus cases have been treated with the solution mentioned, and the control of the radium over the process has been surprising. Chronic empyema of the accessory sinuses (cures of which by radium internally have been reported) has been treated in two instances.

Radium in Arteriosclerosis. C. Everett Field's⁸ experience recommends the administration of radium in this condition by means of emanation, inhalation, radioactive drinking waters, solutions of radium salts for drinking, emanation baths, and, by intravenous or subcutaneous route, the bromide or chloride of radium. It has apparently no toxic effects and the dose in high blood-pressure is governed by the chronicity of the case and the involvement. In a series of 190 cases, the average systolic pressure was 100 and the average reduction was 40 mm.

Radium in Nervous Disorders. Alfred Gordon,⁹ led by the claims made for soluble radium salts when injected into the circulation, has made experiments on dogs in order to demonstrate what the effects of radium are when it is brought into direct contact with the central nervous system. The phenomena observed tend to prove a direct effect of radium solution on the fibers of the pyramidal tract and on the erection center in the lumbar segment of the cord. The appearance of a spastic state of the legs following an intradural injection of radium solutions in two animals was so striking that a further experiment was undertaken which gave a similar result. It seemed that no matter how feeble the emanations of radium may be they are not of different character when brought into contact with living tissue. The effect of very feeble emanations of radium have a damaging effect on nervous substance, which appears to be, in animals at least, of a stimulating and irritating character. Caution consequently should be exercised in using soluble radium salts in organic diseases of the nervous system, at least by the intradural method.

(8) Med. Record, Jan. 22, 1916.

(9) New York Med. Jour., Dec. 18, 1915.

Radium Treatment of Scars. Although the literature contains much on the radium therapy of keloids, very little is said on the treatment of scars with radium. Kaminer¹ has forty-nine soldiers under treatment. For the present he reports only ten cases. These were cases of scar formation, causing deformities, marked limitations in normal function of the parts involved, and frequently pain. The exposures varied from three to eight in number, the total time of radium exposure from sixteen to forty-three hours; about 25 mg. of radium were used. In all the cases cited improvement was marked. No ill-effects were observed.

Radium in Non-Malignant Conditions. Walter B. Chase² recalls that radium has been used with benefit in the treatment of such conditions as tuberculous glands of the neck, metrorrhagia from polypoid endometritis, and compound fracture of the leg with sinus formation.

Bissell³ records excellent results in the treatment of local infections and blood dyscrasias, particularly pernicious anemia and the persistent anemia following surgical injuries. These results are contradictory to the general opinion that radium is useful only in malignant conditions.

Radium Treatment of Epithelioma. While radium is not a cure-all, it will cure every case of epithelioma that is amenable to treatment says Thomas C. Kennedy.⁴ When used intelligently it is a painless, safe and efficient method of treating malignant skin affections, and is to be preferred in epithelioma of the face. The number of treatments varies; improvement usually is noticed after two or three exposures, and frequently after the first. The analgesic action is marked and is frequently noted after the first application. It is held by some physicists that there is a decided difference in the physical properties of α -ray and radium. The latter has effected cures in cases in which the former had failed.

Radium and Mesothorium in Cancer of the Upper Respiratory Tract. Albanus⁵ states that at Hamburg-

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- (1) Berlin. klin. Wochenschr., May 3, 1915.
 - (2) Long Island Med. Jour., December, 1915.
 - (3) Med. Record, July 19, 1915.
 - (4) Jour. Ind. State Med. Ass'n., July 15, 1916.
 - (5) Bruns. Beitr., 1915, 92.

Eppendorf surprisingly good results are obtained in the treatment of cancer of the upper respiratory and digestive tract by means of radium and mesothorium. While no claims are as yet made in regard to permanent cures, cases appear most promising—so much so, that a trial of the treatment seems permissible even in operable and not quite incipient neoplasms of the mucous membrane. Large doses are requisite. Not less than from 50 to 100 mgm. of radium bromide should be used, although there is no gain in using more than 200 mgm. The radio-active substance is best applied in tubes or capsules.

Radium Treatment of Uterine Fibroids. J. and J. L. Ransohoff⁶ state that, except in unusual cases, radium or the *x*-ray is the treatment of choice in uterine fibroids and in cases of essential uterine hemorrhage. Radium has many advantages over the *x*-ray in these cases. It can be brought into direct contact with the diseased uterus, whereas the *x*-rays depend for their effect almost entirely on their action on the ovaries. Radium is therefore more likely to decrease materially the size of the tumor often causing, in fact, its complete disappearance. With radium thus employed, moreover, there is no risk of a deleterious action on the skin. Radium is rich in beta radiation, which is entirely lacking in the *x*-rays. The beta radiation, as shown by Abbe, exerts a marked inhibitive action on new tissue, particularly on its blood-vessels. It undoubtedly acts on the endothelium of the capillaries, causing obliteration of the latter. In certain cases of menorrhagia it is possible with radium to control the hemorrhage without bringing on the menopause. The radium used for introduction into the uterus should be enclosed in pure rubber tissue, to obviate the burning effect of the secondary rays. As a rule, no additional filter other than a 0.5 mm. silver tube, in which the radium is contained, is necessary. Sometimes, when the radium is to be left in an unusual length of time, further filtration through 0.5 mm. of brass is carried out. Preliminary curettage, as a rule, is not required, though thorough dilatation of the cervix under anesthesia is desirable at the first sitting. The radium is allowed to remain for from six to twenty-four hours, according to the

(6) Lancet-Clinic, Feb. 5, 1916.

size of the tumor and the severity of the hemorrhage. In medium-sized fibroids repetition of the treatment two or three times at intervals of two weeks is generally sufficient, though in very large fibroids more frequent applications are necessary.

Action of Radium on Transplanted Tumors. According to Wood and Prime⁷ three factors only are important in the action of radium on tumors: time of exposure, amount of radium element, and distance between the radium tube and the tumor tissue. The removal by suitable filters of the larger part of the beta rays diminishes proportionately the effect of the radium, but the effect of the gamma rays is in accordance with the same general law which governs the beta rays. Sublethal exposures slow the growth of tumor cells for some time, while still shorter treatments seem to stimulate the cellular activities. Experiments show that when only pure gamma rays are used the necessary exposure is eight times as long as that required when the gamma and hard beta rays combined are employed, but as the latter are largely absorbed by 1 cm. of tissue, the gamma rays alone must be used for all deep work. The effect of radium radiations on tumors cells *in vitro* is less marked than is that on isolated cellular elements. This explains the fact that an exposure which will destroy a small metastatic nodule in man is quite ineffective in the case of a well vascularized primary carcinoma.

Radium Therapy of Uterine Cancer. Fabre⁸ declares that in only about 25 per cent. of the cases of uterine cancer is the growth in such a condition that operative treatment can eradicate the malignant disease. Inoperable and recurring cancers should be treated exclusively with radium, operative measures in these conditions being only secondary and inadequate. On the borders of inoperability, radium may modify the growth until it can be successfully removed. Operable growths should always be removed, but even here radium therapy is important, as it tends to complete the surgical act and ward off recurrence. Ten typical cases are described in detail

(7) Ann. Surg., December, 1915.

(8) Ann. de Gynéc. et d'obst., September-October, 1915.

with the exact technique of the radium treatment applied, and the outcome.

Cancer of the Mouth and Radium Treatment. Sticker⁹ reports fifteen cases in most of which malignant disease of the mouth retrogressed under radium treatment without scars or mutilation. The list includes some cases of recurrence after operations. He declares further that radiotherapy is preferable to surgical treatment in many cases for technical reasons and also from the standpoint of immunity. This statement is based on experimental research which demonstrated that it is possible to induce an implantation tumor in laboratory animals in various different organs and points, inoculated all at the same time, but that after having been once successfully inoculated it is impossible to induce further growths by later implantation of tumor cells at any point. After complete excision of the implantation tumor, however, a new implant "takes" at any and every point inoculated all at the same time. On the other hand, if the implantation tumor was only partly excised and it continued to grow, subsequent implantations gave constantly negative results. These experimental data correspond to what is observed in the clinic during the period preceding metastasis. The cancer long remains solitary, and, especially with cancer in mucous membranes, notwithstanding the constant opportunities for implantation of tumor cells farther along, the mucosa beyond is generally free from metastases, even with extensive ulceration. After vaginal hysterectomy for cancer of the uterus, he continues, recurrence in the vagina is not uncommon, while metastases in the vagina, with the uterine cancer still present, are extremely rare.

These and similar data cited are alleged to explain why radiotherapy is more promising in certain cases than surgical removal of the focus. Under radiotherapy, the cancer cells being gradually destroyed and passing into the circulation cause a lively production of antibodies, and these protecting substances combat the growth of any new cancer cells. The antibodies thus generated are similar in nature to the autolysates of cancer cells which

(9) Berlin. klin. Wochenschr., Oct. 4, 1916.

some are using now in treatment of cancer. None of the experiences in this line reported to date, however, make the distinction which he emphasizes between the periods before and during metastasis. The disregard of this fundamental distinction readily explains the unsatisfactory results to date. It is by no means immaterial whether the tumor autolysates are taken from the body while it is still engaged in producing antibodies, that is, during the premetastasis stage, or whether the material is not taken until after the body has lost its capacity for antibody production.

He describes his fifteen cases in detail; in three the cancer was on the tongue and the radium induced a clinical cure. In one case, only seven twelve-hour exposures, all at night, accomplished the purpose, the cancerous crater healing completely in a few weeks. In seven cases the cancer was in the lower jaw and in five others in the upper jaw. The radium was fastened in a plate made to fit over the upper or lower teeth. One patient wore this apparatus for thirty nights' exposures, and it did not interfere with his sleep. In two other cases the cancer was a recurrence after one or several operations. By modifying the tooth-plate-holder it was possible to apply the rays in various directions thus facilitating the cure.

The Treatment of Parotid Tumors by Radium. Richard Weil¹ says it is unquestionably a matter of importance to determine whether or not a particular type of tumor is especially suitable for radium treatment. Not all of the patients so treated have been cured, and it would make for a greater precision in treatment if it were possible to determine that certain types of parotid tumors respond to treatment whereas others do not. In the case reported, a portion of the tumor was removed for diagnosis and found to belong to a type that has caused considerable discussion, that to which Billroth gave the name cylindroma. The independent position of these tumors among adenocarcinomas gives a rational ground to expect that they will react to therapeutic

(1) Jour. Amer. Med. Ass'n., Dec. 18, 1915.

measures in a somewhat exceptional manner. In the instance under discussion the tumor was of seven years' duration. It was treated for a period of six weeks by the insertion of radium into the tumor. This was followed by the disappearance of the tumor which after two years shows no recurrence.

Radium in Treatment of Recent Local Fibrosis. Laborde,² at the meeting of the *Société de chirurgie*, Paris, reported a case in which the well-known property of radium of reducing fibrous tissues such as keloids was made use of for the removal of a band of recent cicatricial tissue in the forearm, coupled with neuritis of the median nerve. Gratifying results were obtained, the fibrous tissue disappearing completely in a few weeks, the extensor function of the fingers being restored, and the neuritis of the median nerve, previously pressed upon by scar tissue, being so reduced that the pre-existing pain was relieved.

Radium Therapy in Ear Diseases. Most chronic middle and internal ear affections have a characteristic predominating tendency to formation of fibrous connective tissue and new growths. The recognized action of radium on cicatricial tissues prompted its use by D. J. Spinetto³ in these ear conditions, after it had been proved that this agent was capable of producing a retrogression of fibrous tissue, and that it was not detrimental to the sensorial apparatus of the ear. A glass tube containing 10 mgm. of radium bromide was covered with black paper and gutta percha tissue and introduced into the external auditory canal in contact with the membrana tympani for a period of ten minutes. The period was lengthened by five minutes at intervals of from eight to ten days. Applications lasting one hour were practiced with improvement in hearing and beneficial changes in the tympanum. There were no signs of intolerance in the middle ear or tympanum even in one case in which external dermatitis of the auricle was produced. Further investigations will reveal whether it is possible to improve Eustachian tube conditions in the same way.

(2) *Presse méd.*, Aug. 5, 1915.

(3) *Semana méd.*, Aug. 5, 1915.

THORIUM X.

Thorium X Therapy and Its Dangers. Elimination of thorium X is effected by the kidneys and the alimentary canal. Gastric and intestinal hemorrhage after even moderate doses was noted by Salvatore.⁴ These hemorrhages were so severe in several instances as to endanger the patient's life. In the cases described, all precautions were taken as to surveillance of the patient in the hospital, and the injections were painless. There was no evidence of toxic action such as headache, sweating, tremor, malaise, or febrile reaction.

MESOTHORIUM.

Aggravation from Mesothorium Treatment of Deafness. Burger's⁵ patient was a man of 32 who had for four years an insidious catarrhal infection of the middle ear. After treatment, including insufflation, the hearing was increased from 15 to 20 cm. for the ticking of a watch on the right side and, for the whispering voice, from 10 to 20 cm. on the left. A later examination after another course of treatment seven years later showed the progress of the deafness; the watch could not be heard at all by the left ear and only when held to the right ear; the whispering voice at 75 cm. from the right ear and only at 1 cm. from the left. The man returned six months later with the story that he had taken a course of radiotherapy, 1 mg. of mesothorium having been placed in each ear in turn for one or a few minutes. After five of these exposures in the course of about six weeks, he could no longer hear the whispering voice at all and only loud speaking 10 cm. from his best ear. This aggravation of the condition conflicts with what others have reported from radiotherapy in treatment of deafness, but Burger remarks that with radium and mesothorium treatment we are still groping in the dark.

(4) *Rif. med.*, Jan. 23, 1915.

(5) *Nederl. Tijdschr. v. Geneesk.*, Jan. 15, 1916.

HELIO THERAPY.

General Heliotherapy in Bone and Joint Affections.

Campbell⁶ has used the sun treatment in twenty-eight cases, in eight of which sufficient time had not elapsed to obtain results. In four patients with fistulas improvement was rapid in three, but for various reasons exposures could not be continued. Of the remaining sixteen patients in whom the treatment was satisfactorily given, seven were tuberculous, four had osteomyelitis, two had pneumococcus arthritis, one had peri-arthritis following direct infection of the knee joint, one had arthritis deformans, one had decubitus.

All except one were treated within the city of Memphis, Tennessee, which is about 200 feet above the sea level, having a mean temperature of 61.7 F. (winter 42.5, summer 79.4); average number of rainy days a year, 115. Patients have been exposed every month in the year, but more continuously from March 1 to December 15. No method of fixation except the Bradford frame and extension has been used and no medication except an occasional light purgative. The improvement has been so rapid and so real that Campbell feels that the treatment has a definite action on the local process.

Heliotherapy for the Wounded. Grangee⁷ gives illustrations of his improvised service for heliotherapy of the wounded, and relates that he has been much impressed with the rapid healing of the wounds exposed to the direct sunlight. The scars are less adherent, more supple, and are never painful, while callus develops normally and does not become exuberant. Repair and elimination of sequesters proceeded more regularly and spontaneously. He found that severe wounds responded with fever and inflammation when exposed to the sunlight early, and he was forced to allow the organism a certain interval for recuperation before commencing the heliotherapy. After two or three weeks or a month even the most destructive wounds showed benefit from the exposures; if there was still fever at the time, the temperature dropped to normal. By protecting the wound

(6) Amer. Jour. Orthop. Surg., April, 1916.

(7) Paris méd., Dec. 25, 1915.

against the air, the heliotherapy can be applied to advantage even from the first. The deodorizing effect of exposure to the sunlight is direct and immediate. Suppuration is augmented at first as a rule and then grows less. He has had but one refractory ulceration of the stump of the foot; this was after amputation for dry gangrene consecutive to freezing. An umbrella is sufficient protection for the head at need. He exposes the whole of the wounded area and gradually increases the time from half an hour to three or four hours a day.

PREVENTIVE MEDICINE.

WILLIAM A. EVANS, M.S., M.D., LL.D., Ph.D.

PREVENTIVE MEDICINE.

THE PHYSICIAN AND PUBLIC HEALTH WORK.

Activities of State Health Departments. That sanitary science is still largely in the experimental stage is the opinion of C. V. Chapin.¹

He says: "Ten years ago a hookworm campaign was unheard of, intensive work in typhoid fever was unknown, attention was focused on the sanitarium to combat tuberculosis, the milk station was the one means of reducing infant mortality, the first tuberculosis exhibit had just been held, pasteurized milk was frowned on by physicians and health officers. All these matters are looked at very differently today.

"The hookworm campaign in its original form is over and has left those engaged with less certain ideas as to its control.

"In the prevention of typhoid fever interest has shifted from the city water supply to the rural privy.

"The sanitarium is now given its proper place in tuberculosis work and more attention is given to the advanced case, the dispensary and the nurse.

"It is known that the personal guidance of the mother does more for the baby than does merely the furnishing of good milk. Methods of milk control are steadily changing. The plan of aggressive public health education was scarcely thought of ten years ago. It is now considered the corner stone of prevention. The organization of the health department, too, is changing. The old shotgun methods of doing a little of everything and nothing effectively are becoming obsolete. The

(1) Rep. on State Public Health Work made under the direction of the Council on Health and Public Instruction of the Amer. Med. Ass'n., 1916.

former scheme of an executive board has been found to work badly. A single executive is needed. This state of flux in the science and art of preventive medicine renders standardization difficult and undesirable except along a few limited lines."

Arguing from these opinions, Chapin thinks it unwise to attempt to standardize any considerable part of the methods employed by health departments. Where every state department of health is proceeding along its own lines there is, of course, much loss, but errors can be quickly corrected and wrong procedures changed. If procedures are allowed to set in their present undetermined state many errors would undoubtedly crystallize into practices, and such errors could only be rectified with great expense of trouble and money.

Fifty pages of the report are given over to brief chapters each analyzing the activities of a given state. For example, we learn the following facts and opinions about Illinois from the two and a half pages devoted to that state:

The state board of health is also the state licensing board for physicians, midwives and embalmers. This work costs \$25,000 a year. It is not satisfactory.

Local health organization throughout the state is poor. Communicable diseases are reported better than could be expected. There is a diagnostic laboratory but it is not doing nearly enough work. Diphtheria antitoxin is distributed freely to everyone who needs it at a cost of \$29,000 a year. Typhoid vaccine and prophylactic packets for ophthalmia are also distributed. Rabies treatment is provided for at a private institute. Tuberculosis has just been made reportable. There is no state sanitarium. Occupational diseases are reportable under a non-effective law.

There is no adequate water and sewage law. The State Water Survey has done excellent work. The State Food Commission has charge of food. The Health Department has a dairy inspector. There is a bi-weekly press service which is sent to 375 papers. There is a traveling exhibit which owns two movie films. Some lectures are given. An attempt is made to inspect summer resorts, construction camps and the like.

Inspection of lodging houses costs \$10,000 a year.

The following improvements are recommended: Better registration of births and deaths; improvement of local health administration; establishment of a division of epidemiology; an effective water and sewage law, and machinery for its administration. A supplemental note says that many of these recommendations were embodied in laws by the last legislature.

Chapin holds a diagnostic laboratory of prime importance in the work of controlling communicable disease. It discovers cases of communicable disease, and keeps the physician acquainted with scientific methods of diagnosis, and teaches that the mild atypical case is more common than the typical case of the text-books. The last is probably its most important function.

The diagnosis work of a laboratory covers the following procedures: Examination for diphtheria bacillus, gonococcus, fecal worms, malaria, rabies, and cerebrospinal meningitis, Wassermann and Widal reactions and examination of pathologic specimens and of water and of miscellaneous substances.

The central laboratory of Minnesota makes over 23,000 examinations for diphtheria a year. Florida examined 1,577 specimens for gonococcus in a single year. Kentucky examined 98,622 specimens of feces for worms. Florida examined 5,409 specimens of blood for malaria, Alabama examined 386 specimens for rabies. Pennsylvania examined 7,612 specimens for tuberculosis. South Carolina did 4,188 Widal tests. Colorado did 54 examinations for anthrax. Florida did 2,131 examinations for plague. Connecticut did 2,181 Wassermann tests. Louisiana did 2,692 examinations for cerebrospinal meningitis. North Dakota examined 1,971 pathologic specimens. North Carolina examined 4,669 waters. Mississippi made 4,039 examinations of miscellaneous specimens.

The state health department laboratories are doing a large volume of work and doing it very well.

For direct and effective control of contagion Chapin holds that immediate reports of cases and suspects are necessary. These reports should be made by telegraph or telephone. Weekly reports do little good except to

call the attention of the department to outbreaks which have already gained a foothold. Monthly reports are of no value except for statistical purposes, yet it is noted that a majority of the states have nothing more satisfactory than monthly reports of contagion.

An interesting part of the report is a comparative statement of expenditures of the different state boards:

Expenditures for Health.		Per Capita Expenditure Cents	
Pennsylvania	\$1,047,431.66 ¹	Florida	15.21
New York	284,876.85	Pennsylvania	12.70
Massachusetts ...	180,219.14	Maryland	10.54
Maryland	142,600.00	Vermont	9.27
Illinois	133,919.60	Nevada	7.59
Florida	129,012.03	Montana	5.45
New Jersey	125,942.15	Idaho	5.22
California	112,953.48	Massachusetts	4.95
Ohio	91,736.25	Louisiana	4.93
Louisiana	87,491.20	New Hampshire	4.81
Minnesota	72,013.31	New Jersey	4.47
Indiana	64,719.00	Delaware	4.04
North Carolina..	61,031.78 ²	California	3.96
Texas	48,200.00	Arizona	3.76
Kansas	46,430.00	Minnesota	3.25
Virginia	45,000.00 ³	Rhode Island	3.14
Michigan	44,872.07	Utah	2.93
Wisconsin	38,205.63	Kansas	2.60
South Carolina..	36,112.52 ⁴	New York	2.87
Vermont	33,385.50	North Carolina	2.60
Georgia	33,311.90	Indiana	2.32
Oklahoma	32,700.00	South Carolina	2.27
Iowa	32,568.32	Connecticut	2.24
Kentucky	30,002.45	Colorado	2.19
Missouri	29,206.19	Virginia	2.09
Connecticut	27,000.00	Maine	1.95
Alabama	25,000.00	Ohio	1.80
Montana	23,600.00	Illinois	1.78
Mississippi	22,975.43	Oregon	1.78
New Hampshire..	21,200.00	Oklahoma	1.61
Idaho	19,820.00	Wisconsin	1.56
Colorado	19,980.00	North Dakota	1.48
Rhode Island...	18,569.18	Michigan	1.48
Tennessee	16,552.49	Iowa	1.46
Washington	15,240.99	South Dakota	1.43
Maine	14,893.24	Kentucky	1.27
Oregon	14,000.00	Wyoming	1.24
West Virginia...	14,000.00	Georgia	1.21
Utah	12,150.00	Texas	1.13
Nebraska	10,640.00	Alabama	1.11
North Dakota ...	10,569.38	Washington	1.08
South Dakota ...	9,730.00	Mississippi	1.20

Arizona	9,300.00	West Virginia	1.02
Arkansas	8,970.00	Missouri .....	.86
Delaware	8,492.02	Nebraska .....	.85
Nevada	7,500.00	Tennessee .....	.73
Wyoming	2,100.00	Arkansas .....	.53

(1) Also \$1,183,542.07 for tuberculosis sanatoria.

(2) Also \$52,376.79 for tuberculosis sanatoria.

(3) Also \$45,000 for tuberculosis sanatoria.

(4) Also \$10,000 for tuberculosis camp.

The part of Chapin's report which has stirred up most controversy is the rating of the different states as follows:

	Superiority of Local Health Efforts	Five Categories of Sanitation	Tuberculosis	Diagnostic Laboratory	Sanitation of Bora and Vectors	Vital Statistics	Child Hygiene	Education	Food	Criminal Sanitation	Control of Water and Sewage
	Preventive Supervision	Sanitation	Sanitation	Sanitation	Sanitation	Sanitation	Sanitation	Sanitation	Sanitation	Sanitation	Sanitation
	100	50	25	10	5	2	1	100	50	25	10
Alabama	100	50	25	10	5	2	1	100	50	25	10
Alaska	100	50	25	10	5	2	1	100	50	25	10
Arizona	100	50	25	10	5	2	1	100	50	25	10
Arkansas	100	50	25	10	5	2	1	100	50	25	10
California	100	50	25	10	5	2	1	100	50	25	10
Colorado	100	50	25	10	5	2	1	100	50	25	10
Connecticut	100	50	25	10	5	2	1	100	50	25	10
Delaware	100	50	25	10	5	2	1	100	50	25	10
District of Columbia	100	50	25	10	5	2	1	100	50	25	10
Florida	100	50	25	10	5	2	1	100	50	25	10
Georgia	100	50	25	10	5	2	1	100	50	25	10
Idaho	100	50	25	10	5	2	1	100	50	25	10
Illinois	100	50	25	10	5	2	1	100	50	25	10
Indiana	100	50	25	10	5	2	1	100	50	25	10
Iowa	100	50	25	10	5	2	1	100	50	25	10
Kansas	100	50	25	10	5	2	1	100	50	25	10
Kentucky	100	50	25	10	5	2	1	100	50	25	10
Louisiana	100	50	25	10	5	2	1	100	50	25	10
Maine	100	50	25	10	5	2	1	100	50	25	10
Maryland	100	50	25	10	5	2	1	100	50	25	10
Massachusetts	100	50	25	10	5	2	1	100	50	25	10
Michigan	100	50	25	10	5	2	1	100	50	25	10
Minnesota	100	50	25	10	5	2	1	100	50	25	10
Mississippi	100	50	25	10	5	2	1	100	50	25	10
Missouri	100	50	25	10	5	2	1	100	50	25	10
Montana	100	50	25	10	5	2	1	100	50	25	10
Nebraska	100	50	25	10	5	2	1	100	50	25	10
Nevada	100	50	25	10	5	2	1	100	50	25	10
New Hampshire	100	50	25	10	5	2	1	100	50	25	10
New Jersey	100	50	25	10	5	2	1	100	50	25	10
New Mexico	100	50	25	10	5	2	1	100	50	25	10
New York	100	50	25	10	5	2	1	100	50	25	10
North Carolina	100	50	25	10	5	2	1	100	50	25	10
North Dakota	100	50	25	10	5	2	1	100	50	25	10
Ohio	100	50	25	10	5	2	1	100	50	25	10
Oklahoma	100	50	25	10	5	2	1	100	50	25	10
Oregon	100	50	25	10	5	2	1	100	50	25	10
Pennsylvania	100	50	25	10	5	2	1	100	50	25	10
Rhode Island	100	50	25	10	5	2	1	100	50	25	10
South Carolina	100	50	25	10	5	2	1	100	50	25	10
South Dakota	100	50	25	10	5	2	1	100	50	25	10
Tennessee	100	50	25	10	5	2	1	100	50	25	10
Texas	100	50	25	10	5	2	1	100	50	25	10
Vermont	100	50	25	10	5	2	1	100	50	25	10
Virginia	100	50	25	10	5	2	1	100	50	25	10
Washington	100	50	25	10	5	2	1	100	50	25	10
West Virginia	100	50	25	10	5	2	1	100	50	25	10
Wisconsin	100	50	25	10	5	2	1	100	50	25	10
Wyoming	100	50	25	10	5	2	1	100	50	25	10

In presenting the report by Dr. Chapin on State Departments of Health the Council on Health and Public Instruction quoted from its 1914 report which said there is need for further knowledge on four main subjects, viz:

1. The need of a survey of the public health activities of the federal government in all its departments with a view to determining exactly what the federal government is doing for public health.

2. A similar survey of state public health activities.

3. A comprehensive survey of municipal public health activities.

4. A collection of the data on the work being done by voluntary public health organizations.

Dr. Chapin was engaged to report on the second of this group.

[This report by Dr. Chapin has received much adverse criticism. One complaint is that it is inaccurate as to a great many of its facts. At least some of these criticisms are justified. Nor could many errors as to facts have been avoided by reason of the plan followed.

Dr. Chapin has to visit each state board and he had but little time in which to do it. He could give only a few days at most to each board. He had to depend largely on what he was told and what he read rather than what he could discover by observation and individual investigation.

The reports made by the U. S. Public Health Service on various state boards (and even more city health departments) are more detailed and more accurate as would have been expected since each board was investigated by a reporter who spent weeks at his task.

Another complaint is that the comparative ratings are not fair. Some basis for this complaint is found in the inaccuracies already alluded to. Some of them are to the effect that the distribution of values on the score card are not correct, and very closely related to the above is the complaint that the comparative ratings of some of the states is not what it should have been. Naturally, what is very important in one part of the country is less so in another.

As is well known, Dr. Chapin holds that general cleaning up—general sanitation—is not of major importance in the control of preventable disease. For New England his view is the correct one. But authorities in this country and abroad agree that when it comes to tropical and semi-tropical countries what is known as

general sanitation is of more importance than it is in colder countries.

It is very difficult for any person whose training has been in the work of a municipal health department to value properly the activities of a state health officer doing work in thinly settled rural communities. Probably no one man could have done this work of comparing the activities of state health boards any better than Dr. Chapin has done it. But both the devising of a score card and the rating of the different boards should have been done by a committee composed of men from different sections of the country rather than by one man. The reports of the U. S. Public Health Service do not make comparisons between the states or rate the different states.—ED.]

Relative Values in Health Work. Schneider² undertakes the impossible task of valuating the different activities of a department of health. The impossibility of the task lies in the differences which must result from climate, type of population, average income and various other important and, in many instances, unchangeable factors. Yet his conclusions are interesting and will prove very helpful. Before they can be used as a standard for any health department the necessary variations must be allowed for.

The final values which he allows are as follows:

Control of communicable diseases—	
Tuberculosis	12.1
Venereal disease	6.6
All others	25.3
Infant hygiene	20.3
Privy and well sanitation	3.5
Milk control	2.7
Fly and mosquito suppression	2.4
Food sanitation	0.1
Inspection of school children	7.
Vital statistics	5.
Education	5.
Dispensary and clinics	5.
Laboratory	5.
	<hr/>
	100.

(2) Amer. Jour. Pub. Health, September, 1916.

The steps by which Schneider builds up these values are interesting. First, he estimates the possibility, in percentages, of preventing certain diseases. In the registration area in 1913 there were 151,150 preventable deaths. Of these 149,600 were from preventable diseases.

Percentages of deaths from various preventable diseases:

Tuberculosis (all forms)	37.5
Diarrhea and enteritis (under 2)	20.
Broncho-pneumonia	14.
Common contagious diseases	12.6
Measles	4517
Scarlet fever	3854
Whooping cough	3047
Diphtheria	7640
	<hr/> 19058
Typhoid fever	3.7
Syphilis	3.2
Influenza	2.
Puerperal fever	1.9
Gonococcus infections	1.
Other infectious diseases	4.
Nutritional diseases	7.
Pellagra	
Rickets	
Scurvy	
Beriberi	
Poisoning by food	2.
Industrial poisoning	1.
	<hr/> 100.

But other factors such as illness produced, cost, communicability and cost of prevention and care must be taken into account.

Using these as a basis Schneider constructed the following table. Calculation of values for different causes of preventable death and adjustment to include values are arbitrarily assigned.

Another table which gives the judgment of Schneider¹ regarding the efficacy of various methods of controlling contagion is as follows:

(3) Other recent articles on the same subject quoted by Schneider are: Chapin, *Providence Med. Jour.*, January, 1916; Armstrong, *Proc. Fifth Ann. Conf. of Mayors of New York State*, 1914; Terry, *Ann. Rep. Jacksonville, Fla., Board of Health*, 1915.

DISTRIBUTION OF DISEASE VALUES ACCORDING TO LINES OF HEALTH DEPARTMENT ACTIVITY.

DISEASE	Relative Value	Milk Control		Food Sanitation		Privy and Well Sanitation		Fly and Mosquito Suppression		Tuber- culous		Infant Hygiene		Control of Communi- cable Diseases	
		Fraction ^a	Value	Fraction	Value	Fraction	Value	Fraction	Value	Fraction	Value	Fraction	Value	Fraction	Value
Tuberculosis.....	12.3	.02	.25	.....	.....	.....	.....	.....	.....	.98	12.05	.....	.....	.....	.....
Infants' Diseases.....	24.8	.06	1.49	.....	.....	.06	1.49	.06	1.49	.....	.....	.82	20.34	.....	.....
Diarrhea and Enteritis.....	....	(.10)	.....	.....	.....	(.10)	.....	(.10)	.....	.....	.....	(.70)	.....	.....	.....
Broncho Pneumonia.....	....	b	b	b	b	.....	.....	.....	.....	.....	.....	(.10)	.....	.....	.....
Contagious Diseases of Children.....	22.3	.02	.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.98	21.85
Venereal Diseases.....	6.6	b	b	b	b	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Typhoid Fever.....	4.5	.10	.45	.01	.05	.40	1.80	.10	.45	.....	.....	.....	.....	.39	1.76
Other Infectious Diseases.....	2.5	.02	.06	.02	.06	.10	.25	.20	.50	.....	.....	.....	.....	.66	1.65
Poisoning by Food.....	0.0	.....	.....	1.00	.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL.....	73.0	.....	2.60	.....	.10	.....	3.54	.....	2.44	.....	12.05	.....	20.34	.....	25.26

a—Fraction indicates fractional part of disease value estimated preventable by activity.

b—Not distributed.

Organization of Toronto Health Department. The Toronto Department of Health has grown in the last ten years. There has been a corresponding shrinkage in the death-rate especially in the rates from preventable disease. Hastings⁴ holds that street cleaning, water-supply, sewage disposal, and the collection of garbage, do not properly belong in a department of health. On the other hand many of the health and social activities which in other cities develop outside of the health department Hastings has brought together in Toronto under the Department of Health. The organization of that department into bureaus and divisions is shown in the diagram on page 219.

Medical officer of health and secretary in the central office.

Divisions of vital statistics, accounts, morgue and ambulance, isolation hospitals, food inspection, meat and abattoir inspection, plumbing and drainage, communicable diseases, sanitation, dental clinics, housing and industrial hygiene, baby farms and maternity homes, social service, child hygiene, public health nurses, laboratories, sanitary instruction and publicity.

Functions of a Public Health Laboratory. Perkins⁵ gives as the functions of a public health laboratory assistance in diagnosis in doubtful cases of communicable disease, supervision of central and local conditions which may act as foci of infection, provision of means of curing certain diseases such as diphtheria and rabies and research work. He thinks that the laboratory should not make diagnoses on specimens except when the analyst is provided with some clinical data. He holds and proves that laboratory diagnosis work is in the interest of physicians, nurses and patients, and that efforts to trip the laboratory or otherwise to embarrass it or to confuse it are foolhardy, in part, because they eventually react on those who perpetrate them.

In the inspection of food, and especially of milk and water, he thinks the inspection service should be directly under the charge of the laboratory administration. He even goes so far as to advocate that all field men whose actions are largely based on the result of laboratory

(4) Amer. Jour. Pub. Health, February, 1916.

(5) New York Med. Jour., April 15, 1916.

TORONTO INSTITUTE OF SANITARY INSTRUCTION.

MEDICAL OFFICER OF HEALTH
(Secretary of Public Health)

DIRECTOR OF LABORATORIES

MAIN LABORATORY

BACTERIOLOGICAL

CITY WATER SUPPLY

CITY ICE SUPPLY

CITY MILK SUPPLY

LABY DIAGNOSIS

DIVISION OF VITAL STATISTICS

DIVISION OF CHILD HYGIENE

PUBLIC HEALTH NURSES

DIVISION OF SOCIAL SERVICE

DIVISION OF ACCOUNTS

DIVISION OF PLUMBING & DRAINAGE

DIVISION OF MILK & ABATTOIR INSPECTION

DIVISION OF FOOD INSPECTION

DIVISION OF ISOLATION HOSPITALS

DIVISION OF PHONIC & AMBULANCE

DIVISION OF CONTAGIOUS DISEASES

DIVISION OF SANITARY INSPECTION

DIVISION OF DENTAL CLINICS

DIVISION OF INDUSTRIAL HYGIENE

DIVISION OF MUNICIPAL HOUSEKEEPING

DIVISION OF BABY, FAMILY & INFIRMITY HOMES

HOSPITALS SANITARIUM

NURSING

POLICE

EDUCATIONAL INSTITUTIONS

PUBLICITY

MONTHLY BULLETINS

NEWSPAPER TALKS

EDUCATIONAL INSTITUTIONS

analysis should be under the direction of the laboratory chief.

Where a laboratory does work on material of no health importance such as gas and cement the department interested should pay the health department for the service rendered. He thinks public health laboratories should do some research work. The doing of such work improves the tone of the laboratory, gives it reputation and improves the character of other work done.

In order especially that they may do better laboratory work he advocates a close relationship between public health laboratories and universities, colleges and perhaps lower schools. With this opinion Chapin (Report on State Public Health Work made under the direction of the Council on Health and Public Instruction A. M. A.) does not wholly agree. Perkins states a number of excellent reasons for such an alliance. Public health laboratories need both the scientific knowledge and spirit which universities can give them. They need the assistance of the student bodies and corps of instructors to get done the great volume of work which should be done and for the doing of which there is such meagre equipment. The universities need both the material which the public health laboratories have in quantities and the opportunities for training their students which public health work offers. He says that the advantages are so obvious that it has appealed alike to health officials and legislators. Where there is a university easily accessible the relation seems natural and easy.

"All sorts of arrangements have been made but it must be confessed that they have not been particularly successful."

He reviews the history of the relations between the public health laboratories and various universities to show the practical difficulties.

The arguments against such coöperation Chapin holds to be better than those for it.

[Decision on this question must depend upon the circumstances of each case. Speaking generally, I think the Perkins position is the better. There are cases, however, in which coöperative work between university and local health department can not be made effective.—Ed.]

C. E. A. Winslow,⁵ in the table on page 222, gives tabulated information regarding the activities of laboratories of state boards of health. This information was gathered by a questionnaire sent to the various state boards. It is supplemented by information gathered by Dr. C. R. Stingily through a similar questionnaire (*Mississippi Health Bulletin*, 1914).

Laboratory Diagnosis of Tumors. Twenty-four state health laboratories now make microscopic diagnoses of tumors.⁶ This information was developed by a questionnaire sent to each state laboratory. Of these 24 five make the examinations in the state university laboratories, the remaining 19 in the state public health hygienic laboratories. Five charge a special fee for all such examinations. Six charge fees for all except indigents and 13 make no charge for this service. Twenty-six state laboratories approved of such examinations, 18 disapproved and 4 did not answer the question.

The arguments of those who opposed were: "Diagnosis of tissue for cancer is merely a private consultation and is not regarded as public health work." "The appropriation does not permit it." "There is danger of spreading cancer cells into other parts of the body by the excision of small specimens for diagnosis."

Of these objections the only one which Bristol thinks has much merit is the last. Bristol's opinion is largely based on his experience in North Dakota. Nine years ago the North Dakota legislature passed a law requiring that the state laboratory do tumor diagnosis. Since 1907 the North Dakota laboratory has examined about 1,000 specimens of tumors.

A questionnaire was sent to the physicians of North Dakota. One hundred and seventy five replied to this questionnaire; 170 thoroughly approved of the doing of such work free of charge in a state laboratory, though only 125 of the 175 sent specimens to the laboratory.

As to the objection to which Bristol attaches some weight, namely that of taking a section from a malignant growth, Bristol accepts the conclusions reported by Son-

(5) Amer. Jour. Pub. Health, March, 1916.

(6) Bristol: Rep. to Amer. Soc. for Control of Cancer, Bull. 11, July, 1916.

ACTIVITIES OF STATE HEALTH DEPARTMENT LABORATORIES IN 1914.

State.	Laboratory budget.		Diagnostic tests for										Manufacture of antisera for		Vaccines for				Examinations of						Examinations of foods and drugs.		Special investigations of foodstuffs and drugs.		
	Total.	Per capita.	Diphtheria.	Tuberculosis.	Malaria.	Typhoid fever.	Gonorrhea.	Syphilis.	Glanders.	Rabies.	Cancer.	Diphtheria.	Typhoid fever.	Smallpox.	Rabies.	Tuberculosis.	Other diseases.	Examinations of				Examinations of foods and drugs.							
																		Chem.	Bact.	Water and sewage.	Milk.	Chem.	Bact.	Chem.	Bact.				
Alabama.....	\$10,000	.004	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Arizona.....	4,800	.02	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Arkansas.....	38,000	.014	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
California.....	2,600	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Colorado.....	2,600	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Connecticut.....	9,000	.005	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Delaware.....	2,600	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
District of Columbia.....	30,524	.083	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Florida.....	30,560	.011	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Georgia.....	4,400	.008	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Idaho.....	35,000	.013	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Illinois.....	6,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Indiana.....	5,500	.007	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Iowa.....	17,000	.015	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Kansas.....	66,800	.016	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Kentucky.....	5,000	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Louisiana.....	54,300	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Maine.....	5,000	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Maryland.....	19,300	.009	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Massachusetts.....	2,300	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Michigan.....	2,300	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Minnesota.....	2,300	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Mississippi.....	2,300	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Missouri.....	2,500	.0097	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Montana.....	4,900	.011	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Nebraska.....	12,000	.01	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Nevada.....	5,000	.014	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
New Hampshire.....	6,400	.008	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
New Jersey.....	20,200	.005	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
New Mexico.....	No Laboratory		++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
New York.....	47,866	.005	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
North Carolina.....	14,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
North Dakota.....	10,000	.015	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Ohio.....	16,700	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Oklahoma.....	5,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Oregon.....	9,000	.002	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Pennsylvania.....	9,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Rhode Island.....	5,500	.004	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
South Carolina.....	2,500	.001	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
South Dakota.....	2,500	.001	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Tennessee.....	16,200	.05	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Texas.....	6,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Tennessee.....	16,200	.05	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Utah.....	6,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Vermont.....	7,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Virginia.....	2,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Washington.....	2,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
West Virginia.....	2,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Wisconsin.....	5,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+
Wyoming.....	5,000	.003	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+

dern, a member of a committee appointed by the American Society for the Control of Cancer to consider just that point. The conclusions are: "In the removal of tumor tissue for diagnosis, the advantage of such microscopic examination as well as the danger of aggravating the disease by this procedure must be considered. In many cases the diagnosis outweighs the danger of removal of tissue for this purpose and the procedure is justified in the opinion of the majority. The necessity for this may be determined by the skill of the clinician. Opposed to the procedure in general is the danger of aggravating the condition by the excision and this varies according to the nature and the position of the growth. To cut through the skin into a malignant tumor of the breast in order to remove a piece for examination is generally discountenanced. Errors in diagnosis result from the excision of inflammatory tissue on the margin of a tumor when the section does not include tumor tissue, this being most frequent in the breast and prostate. Incisions into actively growing, deep-seated, malignant tumors should be avoided as this may disseminate infection through the vessels, may permit extension or accelerate growth by relief of capsular tension. There is little danger, however, from the proper removal of tissue from any superficial growth of the skin or mucous membrane. Crushing or kneading malignant tissue should be carefully avoided under all circumstances."

Visiting Nurses and Social Service Workers. Gerstenberger⁷ thinks that our present methods of using visiting nurses and medical supervisors are open to objection and in time should be changed. However, the change should not come until the opportunities for training are better than they now are and not until a comprehensive organization along scientific lines is possible.

He says: "I personally have believed for many years that the best results in public health and social medical work can be obtained by placing, practically speaking, all the work of a district in the hands of one home worker and by having the district small enough to enable the one worker really to care for the affairs of the district,

(7) Cleveland Med. Jour., November, 1915.

provided these district workers are directed and supervised by individuals who, on the basis of knowledge and with thoroughness and common sense, can direct and supervise, namely, properly trained physicians."

One of the chief objections to the methods at present employed in the large cities is the duplication of work by the different nurses whose tracks cross in a given district. Gerstenberger found that this objection was not founded on sufficient facts. From 86 to 94 per cent. of "prophylactic" families and from 79 to 89 per cent. of "sick" families were visited by the nurses of one agency only.

The proportion of homes into which two agencies sent nurses in a single month were: "Prophylactic" families, from 5 to 11 per cent.; sick families, from 9 to 17 per cent. There were visitors from three agencies in from 0.21 to 1.71 per cent. of prophylactic and from 1.29 to 3.29 "sick" families. Four agencies in from 0.21 to 0.23 per cent. and from 0.25 to 0.46 per cent. respectively.

Another objection to the present method is that too much time is spent in getting about and too little time in actual nursing. For the present system it is argued that the nurses and others doing social visiting are specialists. The advantage of having trained workers, Gerstenberger thinks, outweigh all the disadvantages of the present system. Therefore, he believes that there should be no change until there can be full-time physicians as supervisors and nurses thoroughly trained in social service.

In Cleveland they are making some beginnings in training physicians and nurses. The senior medical students of Western Reserve University receive compulsory training both at the Central dispensary for sick infants as well as in the Milk Laboratory and in the social-medical work of the prophylactic dispensaries. The University, the Health Department and the Babies' Dispensary and Hospital are working together.

In Gerstenberger's ideal plan the health department and the university must jointly direct the medical nursing and social service. The field nurses must do all work except confinements but they must operate out of a central bureau in charge of a whole time, thoroughly trained district physician. In this central office would be a

babies' and children's department, antenatal and post-natal maternity department, obstetric department, first aid to the injured department, general dispensary, district headquarters for contagious disease, sanitary, food and dairy bureaus of the health department, associated charities office.

The medical men in charge of such districts should have had medical training followed by social training. They should be civil service men eligible to pension. They should have served for three years as apprentice or assistant in the system. Nurses in small districts must continue to do general work.

Rural Whole Time Health Officer. The remarkable results obtained by a full-time health officer in Walker County, Alabama, are related by Grote.⁸ The total appropriation of this office is only \$3,000 a year. The Public Health Service says: "The towns in Walker County are advanced examples of town sanitation."

The sanitation of a mining town, Cordova, was rated 87 per cent. by the government survey. Of the 8,000 school children in the county 5,947 were given a physical examination; 32 per cent. were found to have physical defects. The birth-rate of this county was 32.3 per 1,000. All births were registered. The death-rate was 11.

Intensive Health Work by State Boards of Health. Way⁹ compares the effectiveness and cost of whole-time county health officers and of specialized units of health work done by the state boards of health.

In North Carolina, there are now ten whole-time county health officers. The average accomplishment of each is as follows: Seventy-eight public addresses to an average audience of 85; 12 columns of reading matter in the county papers; distribution of 1,500 pamphlets and 4,000 leaflets; inspection of 45 schools finding therein 500 defective children and having 90 treated; vaccination of 3,000 people against typhoid and 500 against smallpox; building 50 sanitary privies and treating 72 cases of hookworm disease. The indirect good effects of the whole-time health officer's work is very great but there is no way to estimate it.

(8) Southern Med. Jour., April, 1916.

(9) Southern Med. Jour., March, 1916.

In 1915, the state board of health inaugurated the specialized health unit. They had an appropriation of \$400. They ran a six-weeks typhoid vaccination campaign in twelve counties. They used five physicians and five medical students. They vaccinated 52,000 persons or 4,300 to the county.

The next unit of work to be undertaken is a school survey. To support this survey a county appropriates \$10 for each school. For this it gets an inspection and scoring of its schoolhouse, wells, privies, and grounds, with recommendations, a physical examination of each school child; a course of instruction in personal and public hygiene; and examination of students on the subjects covered. Prizes are given.

Other unit activities in contemplation are, county units in infant hygiene work, in anti-malarial work and perhaps in anti-pellagra work.

While Way approves of the whole-time county health officer he thinks unit activities by a state board of health a still better plan.

Intensive Health Work. The intensive community health work which is at this time the type of health activity of the International Health Commission in the United States, is described by Ferrell.¹ The average size of a unit for such intensive work is twenty-six square miles. The average number of families, 161, of inhabitants, 825.

Twenty-eight hookworm and general health surveys have been made. In these 28 communities when the surveys began, 47 per cent. of the families had no privies. At the close, 88 per cent. had fairly safe privies. At the beginning of the work 17 per cent. of the population had hookworm; 92 per cent. of the infected were treated. The average time spent in a community survey in doing intensive work was ninety days.

A working force unit consists of a medical field director and three lay assistants and the yearly salary of the unit is \$5,000. Three units are linked together to form a series. Over such a force there is one medical director. The three units forming a series work simultaneously. Such a force should cover twelve units in a year at a cost

(1) Southern Med. Jour., March, 1916.

of about \$20,000. The number of people covered would be about 10,000 at an average *per capita* cost of \$2.00.

Negro Death-Rate. Trask³ finds that the mortality among colored people is about one and one-half times that of white people. Nevertheless, he does not think the colored death-rate discouragingly high, since it is lower than it has been in the past. It is as low as were the death-rates of white groups twenty or thirty years ago. In fact as low as some white groups are today. With the economic and industrial progress of the colored race its death-rate will gradually approach that of the white population.

These opinions Trask bases upon a very careful analytical study of the mortality of negroes as compared with whites under comparable climatic and economic conditions.

Medical Climatology. Physicians are advised by Carpenter⁴ to make more use than they do of the Weather Bureau. In addition to the daily and other reports on weather which are more or less well known the Weather Bureau issues bulletins and reports among which are some that show the climate of different sections of the country.

In the United States, there are 200 regular stations and over 4,000 special stations each reporting at short intervals to the central office. From this great mass of data accurate studies of climates are made.

A Bulletin of Climatology of the United States by Henry will be found especially valuable. Among the conclusions at which Carpenter arrives are these:

1. Air pressure does not directly affect health. The vague notions as to the relation between prevalence of certain diseases and barometric pressure are not founded on fact. Man will experience greater changes in barometric pressure from riding up and down in elevators than are induced by changes in weather yet no relation between riding in elevators and disease has been claimed.

2. Sunshine and ventilation are of more importance than is relative humidity. The location of a house with

(3) Amer. Jour. Pub. Health, March, 1916.

(4) Jour. Amer. Med. Ass'n., Jan. 1, 1916.

reference to prevailing air currents is of great importance from the health standpoint.

Facts About Cancer. Wood⁵ does not agree that there are cancer states, cancer districts or cancer villages. When such cases have been investigated it has been found either that there was no basis for the charge or else that the reason lay in the average high age of the inhabitant. For instance, in Vermont and New Hampshire there is an excessive incidence of cancer solely because the drift of the younger people to the cities causes the average age of the population to be high.

It is known that brass workers are liable to cancer of the upper extremities; chimney sweeps and briquette workers to cancer of the scrotum; those employed in the manufacture of certain synthetic coal-tar products to cancer of the bladder and x-ray operators to cancer and leukemia but these are but a few of many occupations.

There is great need for study of occupation in relation to cancer. Many of the opinions relating to the relation between cancer and a single trauma are untenable. There is no question but that continued trauma induces cancer.

Wood does not agree with the opinion that Miss Slye's experiments with mice prove that cancer, or even great susceptibility to cancer, can be inherited.

He quotes Bashford as saying that autopsies and microscopic examinations in London hospitals increased the number of diagnosed cancers 30 per cent.

He favors state and municipal laboratories for the examination of specimens taken from growths, or the organization of divisions in present laboratories for the purpose.

A campaign of education on cancer run by the State Board of Health of Vermont was productive of great good. The number of patients who applied for treatment for cancer in hospitals subsequent to this campaign increased very greatly.

Health departments might very well investigate the efficacy of proprietary or advertised cancer cures. In addition to chemical analysis they might try such cures on tumors in the lower animals. Cancers in lower animals are less malignant than cancer in man. If a given

(5) Amer. Jour. Pub. Health, February, 1916.

advertised cure does not cure in a test animal the remedy and those who profit from it should be suppressed by the state.

Vital-statistics divisions of health departments and the proper divisions in life insurance companies should begin at once the collection of accurate data on cancer.

Study of Cancer. The unusual tardiness of the United States Vital Statistics Bureau in issuing the 1914 Vital Statistics Report is explained by Lakeman.⁶ The Director of the Census accepted the suggestion of the executive counsel of the American Society for the Control of Cancer and gathered very much more elaborate data on cancer in the registration area than had been sought before. This data abstracted in the 1914 report is to be issued as a monograph by the Census Office.

The seven heads under cancer in the Bertillon classification are to be divided into twenty-nine subheads. In addition to this the report will include an analysis of the replies to 35,000 letters sent to physicians reporting deaths from carcinoma in 1914.

The result of these studies it is hoped will be far-reaching. Lakeman calls attention to the fact that it was largely through similar studies made in Great Britain by the Imperial Cancer Research Fund that chronic irritation was proved to be a chief conditioning factor in cancer. For instance, such studies developed that external cancer of the abdomen is common among the natives of Kashmir who receive burns from the overheated charcoal warming pan known as the Kangri basket; that in China the women, who eat cold rice, do not have cancer of the esophagus; the men, who eat hot rice, do; that the barefooted natives in the Nile valley develop cancer of the feet in thorn injuries; that work cattle in India develop cancer on the horns to which harness is attached but not on those on the other side.

Another result of the British study was proof that in the male most of the cancers are above the stomach; in the female, they are below it. These facts may be due to the greater irritation of the "upper half of the canal in the male by smoking, alcohol, gulping food, etc., where-

(6) Amer. Jour. Pub. Health, August, 1916.

as the female irritates the lower end of hers more. Especially is she more prone to constipation."

GENERAL SANITATION.

Atmospheric Pollution. During the early part of the year there issued another of those excellent reports embodying collective investigations for which English administrators of matters with scientific relations are famous. In this instance the report was The First Report, April, 1914, to March, 1915) of the Committee for the Investigation of Atmospheric Pollution. A sentence from the preamble of this report is worthy of being quoted, and being commented on. The sentence is:

"Indeed in the case of inquiries of coöperative character it is the function of a committee to prevent the better from becoming the enemy of the good."

[The better is inevitably and always the enemy of the good, in a certain sense. The only way in which the better can supplant the good or, in other words, by which progress can be continuous is by the stimulation of such a reasonable discontent with the good as will overcome inertia and cause the adoption of improvements. What the committee must mean is that it is the duty of such committees and of all others, it may be added, to see that discontent is always reasonable; that the good shall never be changed until it is reasonably certain that the season and occasion is propitious for improvement; and that the change will certainly be for the better and that no discontent shall be incited until such time as the better is reasonably certain to be attainable.—Ed.]

The problem of the committee was the amount of pollution of the atmospheric outside air. They do not report upon any phase of the effects of such pollution in any detail. For the purposes of their investigation they interpreted the term "air pollution" as relating to "such matter—solid, liquid or gaseous—as reaches the surface of the earth or falls upon the buildings, etc., either by its own gravity or with the assistance of falling rain."

They decided to adopt a standard gauge, an illustration of which appears in Fig. 1.

Observations in which these gauges were used extend-

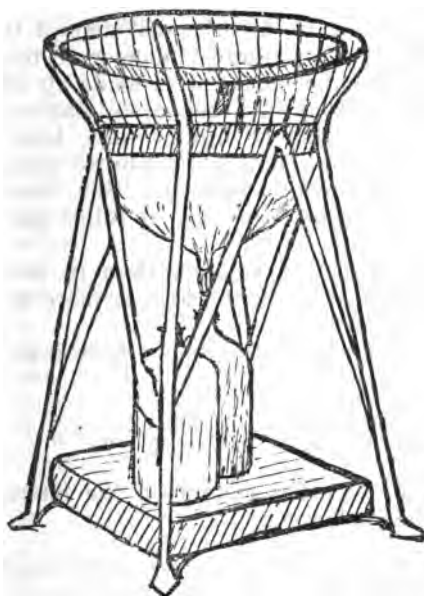


Fig. 1.

ing over a year were made in Birmingham, Bolton, Exeter, Kingston-upon-Hall, Liverpool, County of London, Meteorological Office London, City of London, Malvern, Manchester, Newcastle-upon-Tyne, Oldham, Sheffield, York, Coatbridge, Greenock, Leith, Paisley and Stirling. In all thirty-eight gauges were exposed.

The amount of solids collected was calculated to metric tons per square kilometer. A very good idea of the amount of pollution in the air is obtained from the following table. At one end of the line is Malvern with fairly clean air and at the other, dirty-aired Oldham.

	Deposit per Acre per Month.					Total solids.	SO ₂	Cl	NH ₃
	Tar.	Carbonaceous	Loss	Ash.	on				
	lb.	other than	tar.	lb.	ignition.	lb.	lb.	lb.	lb.
Class A (The Malvern type).....	.023	4.5	9	3.4	6.8	23	4.5	1.4	.023
Class B (The Ravenscourt Park or Chaddle type) .....	.09	18	36	13.5	27	90	18	5.4	0.9
Class C (The Liverpool or Embankment Gardens type)	1.8	36	72	27	54	180	36	10.8	1.8
Class D (The Oldham type)	over 2.25	over 45	over 90	over 34	over 68	over 225	over 45	over 14	over 2.3

The ordinary air we breathe will deposit in an average winter month per square kilometer 15 tons of solid matter which may be regarded as made up of 0.15 tons of tarry matter, 3 tons of carbonaceous matter other than tar, 6 tons of insoluble organic dust, besides soluble salts which include 3 tons of sulphuric acid, a ton of chlorine and 0.3 ton of ammonia. This, figured on the basis of acres, means 9 pounds of solids per acre per month.

The air is cleaner in summer than in winter. Ammonia is the only ingredient which is more abundant in the air in summer.

The committee report that smoke from a domestic fire contains:

Sulphuretted hydrogen	.....51.35	"	"	"
Carbonic oxide	..... 1.55	"	"	"

Analysis of the solids caught on the filters of ventilators in London showed:

Sodium chloride	.....	Trace
Calcium carbonate	.....	2.17%
Ferric oxide	.....	2.44%
Calcium sulphate	.....	5.09%
Alumina	.....	8.34%
Magnesium carbonate	.....	.33%
Sand	.....	37.99%
Carbon	.....	35.48%
Ammonium sulphate	.....	5.77%
Tar (extracted by CS ₂)	.....	1.49%
Fibrous matter	.....	.95%

Two samples of soot analyzed as follows:

SO ₂	..... 6.2%	5.8%
H ₂ O	..... 4.4%	4.0%
CaO	..... 1.4%	2.5%
Fe ₂ O ₃	..... 2.2%	2.5%
Cl	..... 7.7%	7.9%
Ether extract (tar)	..... 28.6%	17.7%
NH ₃ (combined)	..... 4.7%	3.8%
Other constituents	..... 44.8%	55.8%

Rural Sanitation in the Tropics. Wise and Minett's writing of health condition in British Guiana tell of

(6) Jour. State Med., May, 1916.

conditions, which were as follows: Death-rate, 42 per 1,000; birth-rate, 25 per 1,000; infant mortality rate, 300 per 1,000 births. These conditions were changed in certain districts to the following: death-rate, 15; birth-rate, 32; infant mortality rate, 160; malaria practically wiped out.

The points of beginning were the large sugar estates where to secure the enforcement of the necessary measures it was necessary to convince only the central authorities. It is rather easy to show business men that enfeeblement of body and the chronic ill health which result from malaria, hookworm, typhoid and other preventable diseases are both unnecessary and wasteful. Furthermore, in the case of large estates, the necessary money can be found without difficulty. In British Guiana the following minimum requirements for large sugar estates are enforced:

1. A hospital with a resident dispenser and sick nurse.
2. A visit from a health officer at least three times a week.
3. Houses for workingmen subject to the approval of the inspector.
4. Public latrines (outside closets) the type varying with the situation, drainage, etc.
5. Free quinine. The quinine is supplied to the owners by the government at cost.
6. Free treatment for hookworm. Thymol in small but regular doses is used.

These are the minimum requirements. Some plantations go much farther, especially in providing toilet facilities and good water supplies. One of the most difficult of all problems is the sanitation of small tropical towns and villages inhabited by careless, indifferent natives. The government, through the government health officer, insists upon the following as a minimum program:

1. Provision of privies well banked around with clay, and whitewashed regularly; where possible the provision of public latrines over large water courses.
2. All barrels, vats and other water receptacles efficiently screened.
3. Dwellings raised 3 or 4 feet from the ground and

kept clear of enclosures beneath to insure efficient ventilation.

4. Provision of efficient ventilation in old houses.
5. Abolition of insanitary pig-pens from the villages.
6. Control of the milk trade by means of registered cattle pens of approved type and licensed milk sellers.
7. Enforcement of efficient drainage facilities on the village authorities and individual lot proprietors.

If a public water supply is possible the central government advances the money required. An occasional grant of a few hundred dollars for some such improvement as public laterines is made by the central government to the village. In certain places tuberculosis dispensaries and baby-saving stations are being installed.

The coming of the workers of the International Health Commission is eagerly awaited.

Disposal of Human Excreta in the Tropics. Angus MacDonald⁷ says that in the disposal of human excreta the postulate is the prevention of soil pollution. This postulate assumes that there will be no direct pollution of any water that is used or is liable to be used for drinking purposes.

In cities and larger towns premises are sewerred and excreta are disposed of according to some definite plan. Among the rural population excreta are disposed of by each family.

The best method of excreta disposal for a rural home is the deep pit or well method. The pits should be from 8 to 10 feet deep and 6 by 4 feet rectangular. The wall should be lined by brick or stone set loose. The bottom should be unlined. The soil suitable for such a pit is sand, gravel or loam. When a pit becomes filled to within two feet of the surface it should be filled in with earth and a new pit dug. The surface of the ground should slope away from this pit and between the ground and the floor of the privy there should be a cemented brick wall. Such a pit does not attract flies. It should not become a breeding place for mosquitoes. It does not pollute the soil.

Where the congestion of population is such that the pit method can not be used Gibbs advises the dry soil

(1) Jour. State Med., September, 1916.

bucket method. Dry garden earth is a better disinfectant and deodorant than lime or ashes. Even better than dry garden earth is a mixture of equal parts salt and sand. This should be used after each fecal deposit employing about two or three parts of the mixture to one part feces. Salt in this strength deodorizes better than lime, ashes or earth; it kills hookworm; it repels flies.

[This method is not suitable for any portion of the United States except certain very sparsely settled arid districts in the Southwest.—ED.]

The same author in the same publication indicates the amount of infestation with animal parasites in Grenada. In a population of 15,560, 14,758 were examined. The number of examinations made was 25,077, 60 per cent. were found infected with hookworm; 70 per cent. with trichuris; 80 per cent. with ascaris and 97 per cent. were found infested with some form of parasite. Ten thousand six hundred and twenty-six persons were treated for infestation and 3,402 were cured.

Sanitation of Rural Schools. The following four essentials for rural schools are given by McNally:²

First, clean, dry and sanitary grounds; second, an absolutely pure, palatable and wholesome water supply under the full control of the Trustee Board and perfectly protected; third, closets, fly-proof, properly lighted and ventilated, and so constructed as to prevent possible fouling of the ground; fourth, thorough renovation or house-cleaning of the school-room at least twice a year.

In the school-room there should be at least 16 square feet of floor space and not less than 250 cubic feet of air space for each pupil, and the minimum height of the ceiling should be 13 feet. The whole left side of the room, except 6 feet at either end and $4\frac{1}{2}$ feet from the floor is to be utilized for windows. The window sash should be of metal.

If the heat is by stove, then there must be an asbestos-lined galvanized iron jacket so that as nearly as possible the heat may be distributed to all parts of the room. Ducts taking in fresh air from the outside lead to this jacket. The proper temperature of the school room is 67 degrees.

(2) Public Health Jour., April, 1916.

For the water-supply there should be a force pump, a tank over head and a bubbling fountain. This does not cost much and it will save a great deal of sickness.

Rats and Rat-Proofing. C. B. Ball³ advises that the following preventive measures for reducing rat activity be employed.

"Food supply of rats must be reduced by keeping all waste food in metal containers properly covered. It should be made a serious offense to throw garbage into alleys or vacant spaces, or to allow its accumulation within buildings.

"Urgent precautionary measures to prevent access of rats to food in process of handling, as in bakeries, groceries, restaurants, markets, etc.

"The storage of feed for horses, chickens, etc., entirely in metal or concrete containers.

"Foundations of buildings should extend into the ground at least two feet and should be required to be of masonry in all cases.

"Spaces under buildings, whether cellars, or otherwise, should be rat-proofed with cement floors from wall to wall.

"All new buildings of frame construction should be required to be rat-proofed by filling of wall spaces with concrete two feet above the ground. Wooden buildings of all kinds are undesirable on account of the rat menace alone.

"Wooden floors, where rat-infested, should be replaced with concrete floors.

"Plank walks and wooden platforms affording rat runs should be required to be replaced with metal and concrete structures.

"No new earthen drains should be allowed under houses, but cast-iron should be required. All openings which afford access to drains should be stopped.

"The loose materials liable to afford harborage to rats, such as lumber, old iron, wood for fuel, etc., should be piled on racks at least one foot above ground, to allow access underneath of dogs and cats."

Rat Poison. Loir and Legangneux⁴ give the follow-

(3) Domestic Engin., April 1, 1916.

(4) Paris méd., Jan. 22, 1916.

ing formulas for effective rat poisons not poisonous to other animals:

1. Powder of squills and hashed meat. Equal parts of squills and hashed meat made into balls each containing 3 grams.

2. Paste of squills.

Powdered squills	3 grams
Flour	20 grams
Powdered fennel	20 grams
Essence of anise	1 drop
Ordinary fat q. s. to make a hard paste. Make into cakes about 10 grams each.	

WATER SUPPLIES.

Water Supplies and Typhoid Fever. George A. Johnson³ says that there is no question of typhoid being

(3) Jour. Amer. Water Works Ass'n., June, 1916.
an entirely preventable disease.

Of the fifty million people representing the urban population of this country twenty million are now supplied with filtered water.

The average typhoid rate among the cities with no filtered water in 1913 was 20 per 100,000. The use of filtered water would reduce this rate to 14. This reduction would mean a saving of 3,000 lives now lost annually from typhoid fever and a reduction of 45,000 in the number of cases. Three thousand deaths from typhoid and 45,000 cases of the disease represent a vital capital of \$22,500,000 or at 6 per cent. an investment of \$375,000,000.

To build filtration works for the thirty million people in cities which need such works would not cost \$100,000,000. To operate such work and pay all charges would not cost \$12,000,000 a year. If the difference between this sum and the \$250,000,000 which this preventable excess costs were used as a typhoid fighting fund it would be enough (21 cents *per capita*) entirely to eliminate typhoid by controlling all causes of the disease. He says that water filtration plants properly designed, well-constructed and intelligently operated give results which

in practical terms are 100 per cent. hygienically efficient. Sewage purification, while it contributes to pure water, can not be depended upon to make water filtration unnecessary.

His figures show that 49.1 per cent. of those who die from typhoid fever are between 10 and 30 years of age; 75 per cent. are between 10 and 50. The general typhoid death-rate of the registration area is falling but it is falling much more rapidly in the cities than in the country. The typhoid rate is high in July, August, September, October and November as compared with the other months of the year. In the country, the rise starts in June and reaches its maximum in October. In the cities it also begins in June but the maximum is reached early in September. The summer-autumn peak is very much higher in the country than in the city.

This, Johnson interprets as meaning that flies are more abundant, nursing is more careless and water is more polluted in the country than in the city. The average typhoid fever rate of the registration cities in 1910 to 1913 was 18.2. The average rural rate in the registration states was 20.5.

Damages for Typhoid Due to a Polluted Water Supply. The *Journal of State Medicine*⁴ records another successful suit against a government body for damages by reason of typhoid due to a polluted water supply. A miner recovered damages of \$1,250 from the Blackwell Rural district council. The miner's contention was that he contracted typhoid from drinking water which had been contaminated from sewage which entered defendant's water main through a sand-hole in a collar joint.

Blackwell some years before got water from Sutton. When they got an ample supply of their own, Blackwell failed to cut off the Sutton-Blackwell connecting pipe though Sutton did cut it off at their end. The pipe remained a dead end. Into this dead end sewage entered from the leaking sewers of a government not of Blackwell and not on the Blackwell grounds. The jury held Blackwell liable for having left the by-pass in and unprotected.

(4) May, 1916.

Purity of Water Supplies. Jordan^s estimates that 50 per cent. of the total population of the United States is now supplied with water of a high degree of purity. Of the 36,500,000 living in cities of 10,000 and over 30,000,000 are supplied with water that is initially pure or more or less effectively purified; 80 per cent. of the people living in cities of 25,000 and over are getting water that is of a satisfactory quality.

Storage as a means of purifying water is in use in London, New York, Boston, and other cities. It is satisfactory when the storage is long enough. Pathogenic bacteria never multiply in stored water. On the other hand they die rapidly.

Slow sand filtration is in use in Washington, Pittsburgh, Philadelphia and Albany. It costs about \$8.00 a million gallons or, on the basis of 125 gallons a day per person, the yearly cost *per capita* is 36 cents.

Rapid sand filtration is used by Cincinnati, Minneapolis, St. Louis, and many smaller cities. It is especially adapted to cities supplied from very muddy streams. The cost of installation of rapid sand filters is less than those of slow sand but the operating costs are high. The cost of operation plus a proper charge for overhead is less, about \$6.00 a million gallons.

Many cities are treating their water satisfactorily with some germicidal substance. Treatment with ultra-violet rays is too expensive for use on a large scale. Ozonation is too expensive and has not proved satisfactory in some other ways. The most frequently employed method is the use of hypochlorite of lime. The amount used is from 5 to 15 pounds to the million gallons. The chemical under normal conditions costs 2 cents a pound. The chief objection to its use is the liability to produce disagreeable tastes and odors.

Chlorine gas threatens to displace hypochlorite. The gas is cheaper, simpler in use and less liable to be objected to.

Whatever method is employed the result is a drop in the typhoid death-rate.

Jordan says: "At the present rate of progress, water-

borne disease in the cities and larger towns of this country will be relatively rare within ten years."

The U. S. Public Health Reports⁶ give the following standards of bacterial purity required for waters used by common carriers in Interstate Commerce.

1. The total number of bacteria developing on standard agar plates incubated twenty-four hours at 37° C. shall not exceed 100 per cubic centimeter.

2. Not more than one out of five 10 c.c. portions of any sample examined shall show the presence of organisms of the *B. coli* group.

Water in Zinc Water Mains. Thresh⁷ is of the opinion that water containing from 0.7 to 1.6 grams of zinc to the gallon is harmless. He analyzed specimens of water obtained in various parts of Essex for zinc. Every sample contained the metal in amounts varying from 0.25 grams per gallon to 1.6 grams. People who had been drinking this water for seven years had not been harmed by it. When zinc in solution is swallowed it is excreted at once without injury to the stomach or the excretory organs.

When water flows through galvanized iron pipes it dissolves zinc therefrom. The amount dissolved depends upon the length of pipe through which the water flows and the time it remains therein. The first water drawn from domestic faucets in the morning, therefore, is richest in zinc. Zinc is dissolved by hard water as well as soft.

The length of galvanized iron pipe through which the water flowed was a large factor in determining the amount of zinc present as was indicated by the accompanying table.

In this group of illustrations the water used by a small village and farm group was stored in a galvanized iron tank from which galvanized iron pipe ran to the houses supplied.

Thresh thinks it safer and more wholesome to drink water containing 2 grams per gallon of zinc than it is to drink water containing a like quantity of iron.

(6) Reprint No. 232.

(7) Lancet, Nov. 13, 1915.

			grams per gal.
1	400 yards	.....	.8
2	900 "	.....	.8
3	830 "	.....	.5
4	400 "	.....	.3
5	800 "	.....	.5
6	400 "	.....	.3
7	700 "	.....	.6
8	900 "	.....	.6
9	450 "	.....	.3
10	600 "	.....	.7
11	400 "	.....	.12
12	100 "	.....	.8
13	100 "	.....	.25
14	700 to 1,000 yards	.....	.7 to 1.6

Shipping Box for Water. Delapine^s uses an icebox, made as follows for shipping water and other specimens. A stout wooden box $12 \times 9 \frac{1}{2} \times 8 \frac{1}{4}$ inches (E) is lined by a layer of loose felt $\frac{1}{2}$ or $\frac{3}{4}$ inch thick (D). It is well to cover the felt with some waterproof material. Inside the

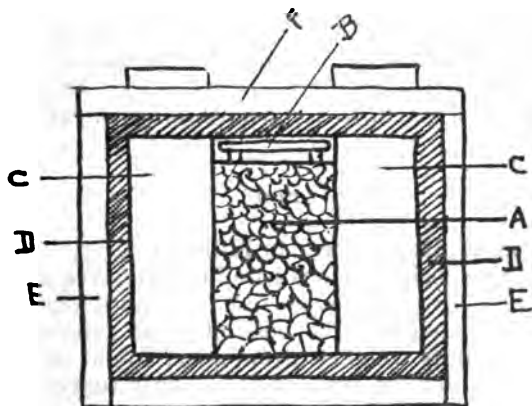


Fig. 2.

wooden box there is slipped a zinc box. In the center of the zinc box is a compartment capable of holding 1,000 grams of broken ice (A). The ice chamber is fitted with a water-tight screw cap (B). Around the ice box are chambers for bottles containing specimens (Fig. 2C). If in a room at 22° C. a bottle containing 250 c.m. of water

(8) Brit. Med. Jour., May 20, 1916.

or milk at 15° C. is placed in one of the compartments of the shipping box, the ice chamber is filled and the box closed, the temperature of the water falls to 8° C. in one hour; to 4° C. in two hours; to about 2° C. in three hours; to 1° C. in four hours and remains below 2° C. for nine hours more. For at least eighteen hours the temperature remains below 4° C.

By placing warm water in the ice chamber the apparatus will serve as an incubator for about 20 hours, without refilling with warm water.

Media and Methods of Bacterial Counts of Water. Race⁹ thinks nutrient agar, (incubation for three days at 20°-22° C.) is the best medium for making bacterial counts in water examination. Gelatine is the most delicate medium but on account of its liquifying tendency it is not to be used. Theoretically, blood heat counts are best for fecal bacteria but, practically, they are not best. Counting at 27° C. has many advantages but it is unsound theoretically as a method for determining the sanitary quality of water. The accepted method of judging a water is by its content of *B. coli*. This is not entirely satisfactory but it is accepted. There should be some better method for determining *B. coli* than we now have.

Food.

Source of Streptococci in Milk. Rogers, Clark and Evans¹ give their opinions based on extensive laboratory research on two very much discussed questions.

The first concerns the possibility of determining by laboratory tests whether streptococci found in milk are from the udders of cows or from other sources. Their conclusion is as follows:

"The presence in lactose bile inoculated with milk and incubated at 37° F. of streptococci forming distinct chains is good presumptive evidence of milk from infected udders. It should be noted, however, that udders may contain streptococci of the pyogenes type without showing physical signs of infection."

(9) Amer. Jour. Pub. Health, May, 1916.

(1) Amer. Jour. Pub. Health, April, 1916.

taminated with fecal matter? The answer which they give is as follows:

"It is difficult to avoid the conclusion that, while the

The second question is: Does the presence of colon bacilli in milk or water prove that the fluid has been con-presence of fecal bacteria in milk can be determined with great certainty, the ordinary presumptive tests and even the usual confirmatory tests do not necessarily prove the contamination of the milk with fecal matter."

Electrical Sterilization of Milk. A method for partially sterilizing milk has been devised by Beattie.² His method consists in sending a rapidly alternating current of electricity through the milk. The apparatus used was capable of sterilizing 30 gallons of milk an hour at a cost of 1.6 cents per gallon.

The method destroyed 99.93 per cent. of all bacteria. It destroys all disease-producing organisms. Special tests made with members of the colon group and with *B. tuberculosis* shows that those organisms were destroyed as were the main milk-souring organisms. The milk kept perfectly sweet for at least three or four days after treatment. No chemical changes in the treated milk have been found by any analyst.

Beattie concludes: "The milk after treatment is, in my opinion, perfectly satisfactory as a food for infants."

[This method is worthy of further investigation. At the present time it can not be regarded as proven to be satisfactory. Even when handling so small a flow as thirty gallons an hour and when operated by men of intelligence and training, there was trouble from flashing and resultant scorched milk. Should it be made more nearly fool-proof and should machinery for handling large quantities of milk at high speed be devised the method may prove to be a solution of the milk problem.—ED.]

Grading of Milk. Brown³ claims that the experience of New York City justifies the methods of milk control in use in that city. The essentials of the plan are:

1. Grading.

(2) Jour. State Med., April, 1916.

(3) Amer. Jour. Pub. Health, July, 1916.

2. Pasteurization of all milk except that intended for special purposes.
3. Bacteriologic standards properly administered.
4. Labelling of all packages intended to go to the customer.
5. Constant inspection and supervision of the pasteurizing plants.

The grades are on the following basis:

Grade A:—

1. Raw:

Dairies' equipment	25 or over
methods	50 or over
Bacteria.....	60,000 per cubic centimeter

2. Pasteurized:

Dairies' equipment	25 or over
methods	43 or over
Bacteria—	
200,000 before pasteurizing	
30,000 after pasteurizing	

Grade B:—

Pasteurized:

Dairies' equipment	20 or over at present
methods.....	35 or over not enforced

Bacteria:

1,500,000 before pasteurized in city	
300,000 before pasteurized in country	
100,000 after pasteurized	

Grade C:—

Pasteurized:

Dairy, total	40
Bacteria	300,000

Clarifying Milk. Bahlman⁴ thinks that the use of clarifiers for market milk is not of unalloyed advantage. In eight tests made in the Cincinnati Health Department the average increase in the bacterial count of milk put through the clarifier was 27 per cent. Some bacteria were removed but this was more than offset, so far as the count was concerned, by the breaking up of clumps of bacteria and the distribution of the individuals throughout the milk.

The sludge, slime or residue in the clarifier is a greyish mass of unsightly appearance. The sludge was in two layers—the bottom greyish, rubbery and tenacious; and the upper, light gray and more fluid.

(4) Amer. Jour. Pub. Health, August, 1916.

The sludge was 60 per cent. moisture, 40 per cent. solid matter and contained 950 million bacteria per gram. The dried sludge contained organic matter—85.36 per cent.; mineral matter, 14.64 per cent.

Systematic analysis of dried sludge:

	Per cent.
Protein (N \times 6.38)	67.9
Fat	3.4
Milk sugar	7.8
Crude fiber	2.2
Silican	3.8
Oxide of iron .....	.5
Oxide of alumnia .....	.6
Calcium phosphate	3.6
Potassium	6.2
Sodium and potassium chloride.....	.1
Undetermined	3.9
	<hr/> 100.0

The protein consists largely of casein. The casein in milk being in combination with calcium phosphate is not in perfect solution and can, therefore, be thrown out. This is the probable explanation of the thin film, which can be thrown out of the cleanest and best milk by very rapid centrifuging. The sludge contains, therefore, the ordinary ingredients of milk plus some foreign matter.

Sludge or slime can be obtained from the best certified milk. The slimes from milk on which the dirt test has been made contain no hair, manure or gross dirt showing that filtration for the dirt test is effective. The statement, sometimes made, that the sludge contains ingredients of high food value is not wholly borne out by these tests.

No tests for vitamins or other ferments essential to growth and health were made. The sediment contained about 28 per cent. protein (67.9 per cent. of 40 per cent.) and this is to be subtracted from the food value of the milk but the quantity of casein thus subtracted is not great.

Seven hundred and twenty-five gallons of milk yielded 2½ pounds of sludge, or 1.6 grams per gallon—a loss of 6 grams of protein out of a total of 12,000 grams.

Bahlman concludes that from the producers' and dealers' standpoints clarifiers are excellent devices in that

they remove gross dirt speedily, thoroughly and economically but that clarification is not in any way a remedy for faulty conditions at the source of supply nor is it a substitute for pasteurization.

Homogenized Milk. Baldwin⁵ has found no objection to homogenized milk or cream from the health standpoint and he, therefore, discusses its advantages and disadvantages as a "trick of the trade."

The effect of homogenizing is to diminish the size of, and make rather more uniform, the fat globules in milk as shown by the accompanying table.

	Diameter in Millimeters of Fat Globules.							
	.009 to .007	.007 to .006	.006 to .005	.005 to .004	.004 to .003	.003 to .002	.002 to .001	.001 to .0005
	f.	m.	mo.	f.	f.	v.f.	...	...
Natural Cream								
Homogenized Cream								
Machine No. 1—								
1000 pounds pressure	v.f.	f.	m.	m.	mo.	v.f.
2000 pounds pressure	v.f.	f.	m.	mo.	v.f.
4000 pounds pressure	f.	m.	mo.	v.f.
Homogenized Cream								
Machine No. 2—								
700 pounds pressure	v.f.	m.	m.	mo.	v.f.
2000 pounds pressure	m.	mo.
3500 pounds pressure	v.f.	f.	m.	granular mo. granular

Legend. f. = few. v.f. = very few. m. = many. mo. = most.

It will be noticed that in natural cream most of the globules are from 0.005 to 0.006 millimeters in size. In homogenized cream most of them are one-fifth as large—from 0.001 to 0.002.

Some uses of homogenized milk that may be termed health advantages are the following:

Ladd⁶ uses a combination of skim milk and olive oil homogenized in feeding babies who have an intolerance for milk fat.

The same author⁷ advocates the use of homogenized cod-liver oil and soya bean oil in malt soup mixtures.

Baldwin says that one commercial company is making

(5) Amer. Jour. Pub. Health, August, 1916.

(6) Archiv. Pediat., June, 1915.

(7) Boston Med. and Surg. Jour., July 1, 1915.

or is about to make a modified milk in which cocoanut oil is used instead of milk fat for cases in which such a mixture is suitable.

Homogenized whole milk can be sterilized and canned without having the cream separate or butter form in the can. A distinct advantage is that all homogenized products are necessarily pasteurized since homogenizing is done with milk that is hot.

The possible health disadvantage is the fact that products deleterious to health may be incorporated in milk by the homogenizer. While, in Baldwin's opinion, the trade up to the present time has made use of few fats not milk fats in homogenizing, there is always the danger that, the bars let down, even unwholesome fats may be employed.

Homogenizing is of interest in the main from the commercial standpoint. It is of interest to know that the process was first used as an aid in the manufacture of oleomargarine. Gaulin, the original patentee, had in mind that by homogenizing milk he would prevent it from churning while in transportation.

Some of the commercial possibilities of homogenized milk are as follows: A 20 per cent. homogenized cream looks like a 25 to 30 per cent. article. By separating the cream from the milk, homogenizing it and returning it the milk shows a much better cream line. On the other hand if it is desired that there shall be no cream line the milk as a whole can be homogenized and used as whole milk. Or, butter, cold storage butter, renovated butter, oleomargarine or vegetable fats can be mixed with skim milk or powdered milk in solution and homogenized. Or, cream can be separated when abundant, placed in cold storage and a long time afterward mixed with condensed milk or skim milk and frozen for ice cream.

Baldwin says: "During the present year there was an official seizure of a large amount of homogenized evaporated milk with a total fat content of 6.53 per cent. which consisted of a mixture of 17 per cent. butter fat and 83 per cent. cocoanut oil."

Homogenized milk will not churn.

The Babcock test does not work on homogenized milk.

Shellfish Examination. Bates and Round⁸ think that reports of various bacteriologists on oysters can not be compared because of variation in the methods of taking the specimens.

Oysters are live animals and they are constantly absorbing and giving off bacteria. The standard methods of shellfish examination⁹ need to be still further modified so as to offer specific directions as to how and for how long the oysters shall be held.

Examination of Sausage. Cary¹ examined bacteriologically thirty-four samples of sausage gathered from meat shops on the south and west sides of Chicago.

The number of bacteria per gram of meat growing on 1 per cent. glycerine agar neutral to phenolphthalein varied from 650,000,000 to 200,000,000.

Winzirl and Newton have set 10,000,000 bacteria as the limit beyond which the bacterial count of sausage should not go. Three of Cary's samples went beyond this limit. Three samples were "small link bulk" sausage. The sample which had only 650 bacteria was bulk sausage direct from the farm.

Cary says that sausage should not be condemned on the bacterial count alone. Many factors such as the precautions used in manufacture, proper handling in the shops and the presence of preservatives may influence the count greatly. A big bacterial count may be present in wholesome sausage.

The counts found in the better residential districts were higher than those of the sausages bought in the shops in the poorer parts of town. He thought this might be due to the greater amount of sulphite used in the shops in the poorer parts of town. Yet bacteriologic examinations of sausage containing sulphite and sausage not containing it, shows that the former had higher bacterial counts. This does not indicate that sulphite is of much service in controlling bacterial growth. Of thirteen samples tested for sulphite eight contained it.

Properly prepared sausage skins can not be considered

(8) Amer. Jour. Pub. Health, August, 1916.

(9) Amer. Pub. Health Ass'n., 1911-1912.

(1) Amer. Jour. Pub. Health, February, 1916.

to increase the bacterial count or the danger from pathogens.

B. coli is commonly present in sausage. It gets there not from the casing but from bad sanitation in the places of manufacture.

Organisms biologically related to but not identical with the enteriditis group were found in 25 per cent. of the samples and *B. proteus vulgaris* in 33 per cent.

Cooking sterilized three of the samples of sausage out of six. A sample containing 813,000 bacteria was allowed to simmer in water for ten minutes and then fried in lard for fifteen minutes. It was sterile.

Another sample containing 929,000 bacteria after it had simmered in water for ten minutes and fried in lard for ten minutes was found sterile.

A third containing 32,000,000 bacteria after it had been fried in lard over gauze for twelve minutes was found sterile. At the end of eight minutes of cooking there were 200 bacteria.

A fourth containing 5,700,000 bacteria before cooking had 105 after being boiled in water for thirty minutes. A sixth containing 47,700,000 bacteria had 60 bacteria after being fried in hot lard over asbestos for fifteen minutes.

Proper cooking, therefore, can be said to sterilize sausage.

Starch is very commonly added to sausage. For this custom there are three reasons: it alters the flavor, it lessens the shrinkage when the sausage is cooked and it lessens the cost; 56 per cent. of the samples examined by Cary contained starch. The percentage was lowest in the high-priced sausage and highest in the cheaper goods. One sample contained 12 per cent.; one, 10; two, 8; three, 6; four, 5; and three, 4. The average was 2.5 per cent.

DISPOSAL OF SEWAGE AND OTHER WASTES.

Progress in the Art of Sewage Purification in the Year June, 1915, to June, 1916.² The process which has attracted the attention almost to the exclusion of

(2) Abstracted by Arthur Lederer.

all others is the so-called "activated sludge" process. It is of English origin and the men to be credited with it are Fowler, Ardern and Lockett⁴ of Manchester.

The experiment began with the simple aëration of a sewage charge and it required five weeks' continuous application of air to oxidize the sewage, or in other words to make the sewage non-putrescible. The sludge was allowed to settle to the bottom and purified sewage was syphoned off and replaced by a fresh charge of domestic sewage. It took a much shorter time to accomplish complete oxidation.

This procedure was repeated again and again until a well nitrified effluent was obtained by only six hours' aëration in intimate contact with one-fourth its volume of "activated" sludge. The sludge was light brown, very fluffy, settling very readily. It contained three times as much nitrogen, twice as much phosphoric acid and one-half as much fatty matter as ordinary tank sludge.

The process is essentially a biologic one. Prof. Edward Bartow of the Illinois State Water Survey initiated experimental work along this line in this country the latter part of 1914. He has published a number of articles on the result of his laboratory work in various technical journals. Since then a large number of municipalities and industrial establishments in the United States have become greatly interested. The advantages which are claimed for the process are low initial cost, freedom from nuisance and a sludge of high commercial value as fertilizer. Experimental plants soon began to spring up all over the country—in Milwaukee, Baltimore, Chicago, Brooklyn, Cleveland and Houston.

The results of the small Milwaukee plant have been sufficiently encouraging to its engineers to recommend the installation of a plant capable of treating by this process two million gallons of sewage. The consensus of opinion is that the process is capable of purifying most sewages. There are, however, still a number of important questions to be solved before the process can be said to stand on a solid foundation or be more economical than other existing processes well-established.

(4) Jour. Soc. Chem. Indus., 31, p. 471, 1912; 33, p. 523, 1914.

These points are:

1. Cost of aëration.
2. Comparative complexity of operation.
3. Economic dehydration of the sludge.

Low winter temperatures do not apparently influence the results to a marked extent. In Chicago, packing-house waste is being treated by this method in two plants—one of the Armour Company; the other of the Sanitary District. The indications are that the process applied to packing-house waste is effective but the operation is not so smooth and dependable as the biologic filtration processes. Nevertheless, most of the difficulties are likely to be overcome by continued study.

Tannery waste is being treated in an experimental way in two or three establishments and it is claimed with good success. It is certain that the process is much more susceptible to influence of various nature than the other processes established heretofore. It requires continued attention and thus is probably not applicable to small towns, particularly where the operation of public works such as sewage treatment plants is dependent on local politics. Reports of experimental sludge plants were published by the cities of Milwaukee, Wis.; Cleveland, Ohio; and Houston, Texas.

Another process tried but with much less success is the electrolytic process. On the whole, responsible engineers believe this method, even if its accomplishment were admitted, of sewage purification too expensive. Moreover, the enormous quantity of sludge resulting is commercially of very little value, if of any, and is difficult and expensive to handle. Very few old-style septic tanks are being built in this country at present. The Imhoff double-deck settling tank seems to be the most favored type, removal of the settlings suspended matter is required. Some of the "septic" tanks in this country are being remodeled into Imhoff tanks. The gases from the sludge digestion chamber of these tanks have been utilized in one or two cases for small scale lighting and heating purposes. Screens of the Riensch-Wurl type are installed at Cleveland, Brooklyn and Long Beach, Cal.

A process which has been originated by G. W. Miles

and quite recently described by R. G. Weston⁵ deals with the purification of sewage with the aid of sulphuric acid. The Miles process attempts by the addition of an acid to precipitate the bulk of the solids from sewage, a form of sludge which can be dried and degreased. It is claimed that sufficient fat is recovered to make the process valuable from the economic standpoint. The sludge is inoffensive and treated sewage fairly sterile with stability somewhat improved. It is not likely that the process will be of general use as it concerns only sewage with a high saponifiable fat content. The trend of opinion of competent sanitarians is towards water purification primarily. The purity of water must never be left to chance. The purification of sewage is of secondary importance and resorted to to relieve the load on the water filters or to avoid an actual nuisance or to protect a shellfish industry.

The most notable contribution to the literature of the past year is contained in Metcalf and Eddy's "America's Sewage Practice," a work of three volumes covering the design and construction of sewers and the disposal of sewage.

Trade Wastes in Streams. The English Royal Commission on Sewage Disposal⁶ fixes the following as the limits beyond which pollution of streams with certain manufacturing wastes shall not go. These wastes are supposed not to be mixed with sewage.

	Suspended solids per 100,000	Dissolved or absorbed in 5 days— per 100,000
Wastes arising from		
Mining and quarrying operations.....	4	
Toiling water from crushing tin, lead and zinc ores	6	
Clay-setting pits and stone-quarry washers....	6	
Dyeing and printing of cotton goods.....	4 to 6	
Dyeing and scouring of wool	4	
Paper mills		
(a) Wood pulp mills	4	
(b) Other mills	6	
Wool scouring liquor	4	4
Brewery waste and steep water from maltings.	4	4
Distillery waste	3	2

(5) Amer. Jour. Pub. Health, 1916, 6, p. 334.

(6) Jour. State Med., January, 1916.

Fellmongers, tanners	4	4
Dairy, creamery, cheese, condensed milk, butter, margarine	4	4
Distillations of shale and spent gas liquor...	4	4
Metal waste from galvanizing and tin plate works	6	

Street Dust and Street Sweeping. During the year 1915 the Public Health Committee of the New York Academy of Medicine, after some investigation supplemented by a review of the literature, reported against the ordinary methods employed in sweeping the streets.⁷ They are of the opinion that no method of street cleaning can ever be satisfactory so long as it employs dry sweeping and does not eliminate gross street dust.

As to infectiousness of street dust they summarize as follows:

1. Numerous bacteriologic examinations made in this city as well as elsewhere show that street dust contains a variety of living pathogenic organisms such as tubercle bacilli and various types of streptococci which are recognized as causative agents of many respiratory and other diseases.

2. Although there exist only a very few positive instances where the production of disease can be traced directly to pathogenic bacteria present in dust, yet the fact that these organisms are found in appreciable numbers in street dust and are inhaled or ingested establishes a presumption that street dust may at times be a cause of disease.

3. Studies with reference to the incidence of certain respiratory diseases show that persons free from exposure to city dust are less liable to suffer from these diseases than those so exposed.

4. Dust has, for a long time, been universally recognized as an injurious mechanical irritant and as a cause of lowered bodily resistance, and one of the first prerequisites of public health has been the elimination of dust so far as possible.

5. Dry sweeping should be entirely abandoned. An adequate system of street flushing should be introduced in street cleaning procedures of our cities and effort

(7) Med. Record, Dec. 18, 1915.

should be made to apply all available means to make the streets as free from dust as possible."

VENTILATION.

Ventilation of School Rooms. The Chicago Commission on Ventilation (1914-1915 Report) says emphatically: "Good ventilation shall produce immediate comfort. Under the conditions with which we were working, we found that a temperature of from 64 to 70 degrees with a corresponding relative humidity of from 55 to 30 per cent. seems to be the limit, that is, the comfort zone for us was between 64 degrees and 55 per cent. and 70 degrees and 30 per cent. It is worthy of note that with a temperature below 67 or 68 with a proper relative humidity the pupils were better able to give attention to their work than if the conditions were otherwise."

The report gives sixty-eight detailed standards for heating and ventilation; sixteen of these relate to ventilation in general, nineteen to cars—street cars, elevated cars and railroad cars—seventeen to picture theaters, and sixteen to school-rooms. The standards for school rooms are as follows:

Either the plenum or vacuum principle is applicable to the ventilation of school-rooms.

In the artificial ventilation of a school-room, the air inlets and outlets should be of such size, number, and location as to insure equal distribution of air throughout the room; the maximum temperature for a school-room, artificially heated, should not be more than 68 deg. F.; the relative humidity of a school-room, artificially heated, should not fall below 40 per cent.

In the present state of knowledge and practice the quantity of air supplied to school-rooms for ventilation should not be less than 30 cubic feet per pupil per minute.

Both the design and location of the air intake for a school-building should be such as to minimize the possibility of contaminating the air supply.

Efficient air cleaning devices are desirable in all ventilating installations where the air supply is liable to be contaminated by dust, or other objectionable matter.

In the automatic control of temperature within a school-room, the thermostat should be so located as not to be influenced by wall chill. The thermostat should be so located as to be influenced by the average temperature of the room only.

In mechanically ventilated school buildings, it is desirable at stated periods to flush all the school-rooms in the building with fresh air by means of open windows.

Careful consideration should be given to the sweeping and cleaning of the school-room as effecting its ventilation.

The temperature of a school room should be kept as low as the comfort of its occupants will permit; and that the temperature may be kept down by increasing the relative humidity.

In the proper ventilation of a school building in cold weather, it is necessary to provide means for humidifying the air introduced into the building. (See note.)

A constant temperature and a constant relative humidity are not conducive to the highest degree of comfort in a school-room.

In the production of comfort for the occupants of a school-room, the maximum temperature should be associated with a minimum relative humidity, and the minimum temperature should be associated with a maximum relative humidity.

In a school-building artificially ventilated and heated the comfort zone should be established in order that the engineer may properly operate the heating and ventilating system.

The carbon dioxide content alone is not always an index of the contamination of air for ventilating purposes, within an enclosure.

Note: Relative humidity may be increased in a school-room by means of properly muffled jets of steam introduced into the plenum or fan chambers from the boiler supply.

Ventilation Principles. The New York State Commission on Ventilation⁸ as a part of a progress report on ventilation published the following as among their tentative conclusions:

(8) Amer. Jour. Pub. Health, February, 1915.

1. A very high room temperature such as 86° F. with 80 per cent. relative humidity produces slight but distinct elevation of body temperature, an increase in reclining heart-rate, an increase in the excess of standing over reclining heart-rate, a very slight lowering of systolic blood-pressure and a marked fall in the Crampton value.

2. A moderately high temperature 75° F. with 50 per cent. relative humidity has the same effects but in lesser degree.

3. A room temperature of 86° F. with 80 per cent. relative humidity shows no effect on rate of respiration, dead space in the lungs, acidosis of the blood, dissociation of oxyhemoglobin, respiratory quotient, rate of heat production, rate of digestion, carbohydrate or protein metabolism, concentration of the urine and skin sensitivity. The power to do mental and physical work is not diminished. The inclination to do both mental and physical work is decreased.

4. Stagnant air at the same temperature as fresh air, even when it contains 20 or more parts carbon dioxide and all the organic and other substances in the breathed air of occupied rooms causes no deleterious physiologic effects.

5. The appetite for food of persons who stay in such air is decreased.

6. The most important effects of "bad air" are due to its high temperature.

7. The chemical changes in the breathed air of occupied rooms are of comparatively minor importance.

PERSONAL HYGIENE.

Personal Hygiene. Armstrong¹ says that instead of lamenting the small appropriations voted health departments, we had better spend some energy in caring for our own personal hygiene.

Personal hygiene is the next step in health work. The following are among the articles in the personal hygiene creed:

Wash and be clean—and healthy.

Wash your hands before you eat.

(1) Pub. Health Jour., April, 1916.

Insist on your own towel.

Insist on your own cup.

Sneezes spread diseases.

It doesn't cost the city any money nor the health authorities any effort for the average citizen to "screen his sneeze" and to wash his hands before he eats.

Chances of Fame. C. L. Redfield² holds that if an acquirement is to be inherited the parent must make the acquirement first and get the offspring afterward; not

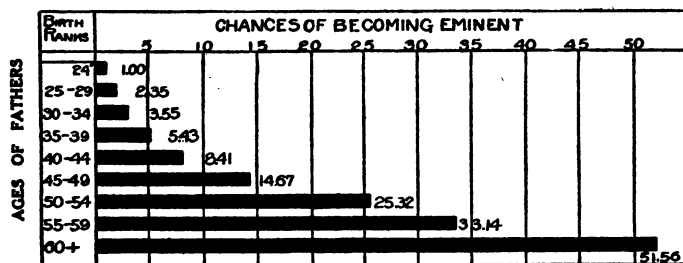


Fig. 3.

get the offspring first and make the acquirement afterward. In support of this belief Redfield cites the biographies of eminent men showing that a preponderance of those cited were the sons of parents somewhat advanced in years. The accompanying chart (Fig. 3) taken from his book illustrates the argument which he makes.

Clothes for Very Cold Climates. W. T. Grenfell³ in describing the clothing worn by the natives in Labrador and Newfoundland offers some suggestions as to fabrics and cut of garments found advisable for an active out-of-door-living people during cold winters (Figs. 4 to 8).

His suggestions as to footwear are especially commended to men who stand in cold, mud and water for long periods. The four essentials for such fabrics are: (1) They must be thin and pliable; (2) they must be wind and water proof; (3) they must be durable; (4) they must be cheap.

The people of Labrador wear garments made of two

(2) Pub. Health Jour., March, 1916.

(3) Brit. Med. Jour., Jan. 15, 1916.

layers of light material rather than one of thick material. Flannel and woollens are never worn as outer garments. The jumper is made of canvas or light waterproof rubber material. Beneath this is a woollen garment.

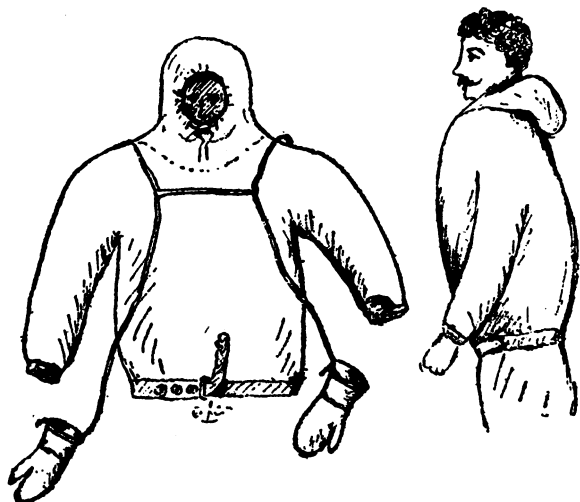


Fig. 4.

The cut of the garment is especially devised to prevent draughts and consequent loss of the heated air next the skin. Neck draughts are made impossible by making a hood continuous with the body piece of the jumper or jacket. Leakage in front is made impossible by making the jacket of one piece. The wearer pulls it on over his head.

Leakage below is prevented by a canvas or webbing belt at the bottom of the jumper. A soft pliable thong or string running through a gusset is used to draw the bottom of the jumper close. Rubber or webbing bands around the wrists prevent leakage there. Leakage around the face is prevented by a draw string around the face opening.

In very cold weather they use two of these garments. The outer one may be of calico, the under one of wool.

Gloves and mitts: Gloves are always worn double.

The inside one is of thick, soft wool. The outside one is either skin or some wind-and-waterproof material. The gloves have a strap around the wrist and the sleeve is gauntlet fashion and goes over the coat sleeve. The gloves are attached to straps which go over the shoulders.

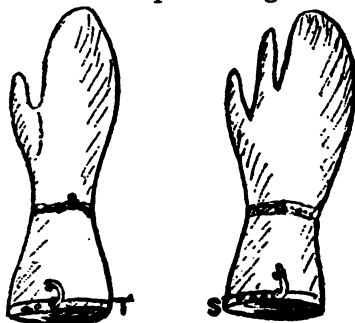


Fig. 5.

Trousers: The outside garment is made of duck or canvas. The trousers have a chest flap which comes over the front of the abdomen and chest and suspender straps

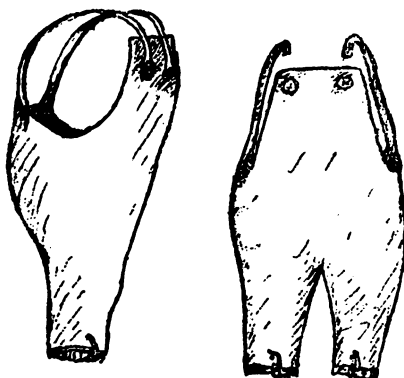


Fig. 6.

running from behind over the shoulders and fastening in front. The back is well above the waist line. There is no opening in front as in ordinary trousers. The trousers go inside the boots.

Boots and socks: The boots are large, the sole is soft and the legs reach to a point just below the knees or a little above them. The top of the boot straps or ties around the leg. The material is sealskin or deerskin. The hair is shaved off and the hide is then used green.



Fig. 7.

The boots have no soles. They are sewn with tendon. No pegs or nails are used. The tendon swells when exposed to water. The threads go only half through the skin as in intestinal suturing. The boots are soaked



Fig. 8.

in, and rubbed with, a mixture of tar and oil. They are made large enough to take three pairs of socks. In very cold weather three pairs of wool socks are used. If the going is very wet a green leather shoe is worn inside the boot and then one or two pairs of socks. Sometimes a knitted or woven woolen vamp inside the boot is worn. The best vamps are made from raw wool containing grease. The Laps use hay or grass wrapped around the feet in place of socks. It has many advantages.

The footwear is warm. It keeps the feet dry. Being soft and pliable it is easy on the feet.

Grenfell thinks this kind of footwear would prevent trench feet. He has had some experience in the trenches in France and Belgium and in the light of what he there observed he advises that some of the Labrador methods be adopted for the army.

The Effect of Drinking on Longevity. As the result of a very careful statistical study of the records of several life insurance companies W. E. Porter⁴ finds that the average mortality rate among total abstainers from alcohol is 68.4 per cent. whereas that of non-abstainers is 91.5 per cent., a difference of 23.1 per cent. The non-abstainer, therefore, suffers a reduction in the length of average life of $2\frac{1}{3}$ years.

Periodic Physical Examinations. Wells⁵ estimates that a company paying \$20,000,000 a year in insurance claims would save \$1,400,000 if it could prolong the life of each policy holder one year. His company, the Equitable, began offering a free physical examination in July, 1914. At the time these figures were assembled 2,032 persons had taken a full physical examination and 1,178 had had a urinalysis.

Of the 2,032, 69 per cent. had some impairment, noted by the examiner, 19 per cent. had some ailment, noted by the examiner and 12 per cent. had no impairment or ailment. The distribution of the impairments were as follows:

	Per cent.
Circulatory system	24
Genito-urinary	20
Pulmonary	4
Digestive	7
Nervous	4
Miscellaneous	6
Entirely without impairment	12
Minor impairments of little importance.....	19
Old age (70 to 85)	4

Cost of Illness in the United States in 1910 and Possible Reduction. The Boston health authorities⁶ estimate the cost of illness in the United States in 1910, the year of the latest census, as follows:

(4) Med. Record, Oct. 30, 1915.

(5) Med. Record, Dec. 18, 1915.

(6) Boston Monthly Health Bulletin quoted by Amer. Jour. Pub. Health, January, 1916.

Estimated number of cases of sickness, on the German basis of 40 per cent. of the number of persons exposed to risk, 13,400,000.

Estimated number of days of sickness, on the German basis of 8.5 days per person *per annum*, 284,750,000.

Estimated loss in wages at an average of \$1.50 per day for 6/7 of the 284,750,000 days, \$355,107,145.

Estimated economic loss at 50 cents per day for 6/7 of the 284,750,000 days, \$122,035,715.

Total social and economic cost of sickness *per annum*, \$772,892,800.

That proper health conservation should prevent 25 per cent. of illness they hold to be a reasonable contention. The estimated possible saving in the total social and economic cost of illness on the basis of 25 per cent. reduction *per annum*, \$193,223,215.

Cancer and the Intemperate Use of Tobacco.

Though Abbe^s says that the public looks to the medical profession for advice, not for reform, he argues against the intemperate use of tobacco. He cites the fact that both General U. S. Grant and his son, General Frederick D. Grant, died from cancer caused by incessant smoking.

An Italian consulted Abbe for inoperable cancer of the lip. Shortly thereafter the brother came in for a constant burning in his mouth which Abbe diagnosed as pre-cancerous and advised that smoking be discontinued. Both brothers had smoked from childhood as had their parents.

Two brothers consulted Abbe with cancer of the mouth. They had smoked from childhood. The father smoked constantly until he developed cancer of the lip.

A gentleman consulted Abbe with cancer of the mouth in an early stage. He was advised to quit smoking. He did—and gave his cigars to his son.

Abbe says: "Patients showing the ill effects of tobacco are only those who have been intemperate in its use." He has never seen serious mouth disease in any patient who had not smoked more than three cigars a day. He has seen a few cases of cancer among cigarette smokers.

The great difficulty in drawing conclusions based on

the above opinion, according to Dr. Abbe, is in determining what is the intemperate use of tobacco. Some can stand much of it without apparent harm. Others are demonstrably poisoned by even small doses. The victims of its dangerous effects are found among those who seem to have some immunity to it.

Maintaining the Working Capacity of Heart Cases. Coleman⁹ has been connected with the Bellevue evening class for cases of chronic heart disease for several years. During the first three years 232 patients appeared at this clinic. Six of these patients had spent 251 days in the hospital the year before coming to the class. Since coming not one of them has been in the hospital for a day. This represents an economic gain for these six of \$817. The occupations of twenty-seven patients have been changed to fit their capacities. The class is now so crowded that each session lasts until practically midnight.

At Sharon, Conn., Drs. Conner and Seymour are conducting a very successful experiment in employing persons with heart disease. The work consists in the manufacture of cement flower pots, window boxes and garden bowls making use of Dr. H. J. Hall's devices. The products of the factory are sold in agencies many of which are run by graduates.

Coleman thinks the first and most necessary step in a health department campaign is to develop methods of finding heart disease in advance of symptoms. Every school child should be examined for heart disease. The records of those found with murmurs should find their way into the records of the health department. The health authorities should know of these individuals when they pass from under the school authorities. Examinations of children for work certificates should furnish another record of impaired hearts. There should be periodic physical examinations of all adults. Coleman favors a compulsory health insurance law.

The next important change is in the attitude of the examiner toward persons with impaired hearts. Such persons should be informed as accurately as possible

(9) Amer. Jour. Pub. Health, May, 1916.

of the conditions found, the possibilities and the limitations.

The next change demanded is education and supervision of those with impaired hearts. The amount of work which they can do and the character of work should be made a matter of careful study in each case. The majority of workingmen who have heart disease are engaged in unsuitable occupation. The best method of getting this supervision among workingmen in large cities will be through the organization of evening classes in connection with the large clinics.

[The New York Health Department is planning a bureau for heart disease. The functions of such a bureau would deal with all of the causes of heart disease, and also with measures for maintaining the working efficiency of people with heart disease.

The conclusive proof of the very great importance of heart disease as a cause of death, the unnecessary loss of working capacity of persons with heart disease, and the lack of opportunities of economic adjustment by such individuals, argue the necessity of such a bureau. Other health departments will follow the example of New York City.—ED.]

INFANT WELFARE.

Declining Birth-Rate. Oliver¹ says that the birth-rate is falling all over the civilized world. Between 1880 and 1909 it fell in Berlin from 38.7 to 23.1; in Vienna from 39.1 to 23.78; in London from 34.8 to 25, and, in Brussels from 34.2 to 16.9.

In 1840, the population of Germany was 32.8 millions, that of France 33.4 millions. In 1910 Germany had 64.6 millions, France 39.3 millions. A century ago France had the largest population among central European states, now she has fifth place, and that position is only maintained by the immigration of one and one-half million people each year. Since the battle of Waterloo, France has added 9.8 millions to its population; Great Britain and Ireland have more than doubled theirs; the German Empire has quadrupled hers; Austria has

(1) Jour. State Med., January, 1916.

increased hers 50 per cent.; so has Italy; Finland has trebled hers.

In the seventies, the people of England were flagrantly told how to prevent conception. Since that date there has been a steady and rapid decline in the birth-rate. In the United States the decline has been just as rapid and just as definite. Germany is feeling the effect of the movement. In some of the German states the decrease has been as high as 40 per cent. The greatest decrease is in the towns and the industrial centers.

Oliver quotes Gruber² as follows: "The declining birth-rate is a serious menace to Germany. In the year 1912 it was estimated that 113 births per 1,000 women aged 20 to 25 was necessary to maintain the population. Only 73 births took place."

The following table of birth-rates and rate of decline in the same is taken from *Rene Bleue* for 1913:

Country.	Per 1,000 inhabitants infants born alive in 1909.	Percentage of fall of birth- rate during the last 30 years.
Russia	48	1
Austria	33.6	12
Italy	32.4	13
Finland	31.3	13
Germany	31	18
Holland	29.1	19
Denmark	28.3	12
Switzerland	26.3	12
Norway	26.2	16
Sweden	25.6	14
England	25.6	25
Belgium	24.9	21
France	19.6	21

Declining Birth-Rate in France. The editor of the *Bulletin du Lyon Médicale*³ is gravely concerned about the small birth-rate in France. He quotes Gautier as saying that France would have been victorious in this war long ago had the 36 millions of French in 1870 multiplied as rapidly as have the 36 millions of Germans.

There should be a population of 70 millions in France.

(2) Münch. med. Wochenschr., 1914.

(3) April, 1916.

The French birth-rate in 1874 was over 26. In 1914 it is below 18. In Russia the rate is 48. In Austria, Germany and Italy it is 32.

Courmont is quoted as hoping for much from a diminished mortality. Vaccination against typhoid has already accomplished much. The infant mortality rates have been reduced and the bad effects of alcohol have lost some of their intensity. But the mortality rate in France is not very high. A further decrease in the rate will only temporize. The need is for an increase in the birth-rate. Some think this can not be done. They say that France has arrived at a stage of civilization where a low birth-rate is inevitable. This war must act as a salutary crisis to increase the birth-rate.

One method to be pursued must be the prevention of abortions. Another is to increase the number of homes for women illegitimately pregnant to protect their secrets and to assist them. The editor agrees with Leroy Beaulieu that the interests of the state demand a minimum family of three children. A normal family consists of three healthy children. A family of four healthy children should be called a large family. A family of ten children, some idiots, some epileptics and some tuberculous, is not desirable from the standpoint of the state. The father of a family of four healthy children should have assistance from the state. On the other hand the father of a family of ten idiots, epileptics and tuberculous should not have such help because he has harmed not helped the state.

In the new society which will come out of this war, the editor says, everybody must work together to help the large families provided they are healthy. The families in which there are degenerates must be weeded out.

Prenatal Care. Conditions in a small village in France are described by Moore⁴ where, thanks to a wonderful mayor, pregnant women have unusual care. The village, Villiers-le-duc, has 230 inhabitants. The village law states that every pregnant woman, whether married or single, not able to have proper care shall have the right to help from the village.

Pregnancy is a reportable condition. Every pregnant

(4) Brit. Med. Jour., May 6, 1916.

woman is asked to report her condition before the seventh month and to name the midwife whom she wishes to attend her. The midwife visits the woman to ascertain if she has albuminuria or any other complication of pregnancy. If it is necessary for her to have medical attendance the village furnishes it. If the woman be confined to her bed for more than six days she gets a grant of 20 cents a day. The village furnishes milk-sterilizing apparatus free or for a small rental according to the circumstances of the patient.

The village has baby-weighing scales. Every baby must be weighed at two-weeks intervals. Infantile diarrhea is a reportable disease.

Midwives must call in a physician whenever there are complications during labor or if the labor continues for more than 24 hours.

Moore advocates: First, the universal notification of pregnancy; second, adequate provision for parturition for every pregnant woman; third, provision for, and supervision of, every infant born; fourth, suppression of fraudulent advertisements which destroy infants; fifth, proper education.

Important Factors in Infant Death-Rates. Moore⁵ sums up the baby situation in the following sentence: "A baby has the right to survive to such an age-period that its own action may influence its destiny and to a reasonable degree of protection from those external influences which imperil or destroy its life."

He agrees with the opinion of the Local Government Board that decreasing the infant death-rate also decreases the death-rate of children. He prepared charts showing the death-rate at different age periods in Huddersfield. These show that the curve for deaths from 0 to 1 year of age is paralleled in its drop by the curve for deaths from 1 to 5 years of age.

Similar charts for England and Wales show that a reduction in the infant mortality rate (deaths under 1 year of age) is followed by a reduction in the mortality in the succeeding years. The infant mortality in Huddersfield has fallen from 156 to 105. According to actuarial estimates this raises the life expectancy of

(5) *Lancet*, April 22, 1916.

children born in Huddersfield 3 years for males and 3.1 years for females.

As to whether the reduction in infant mortality rate affects adversely the death-rate of children from 1 to 5 years, several reports of the Local Government Board speak as follows:

Thirty-ninth Annual Report: "Excessive mortality in infancy implies excessive mortality in later life. English statistics show that counties having excessive infant death-rates also on the whole have excessive death-rates throughout the first twenty years of life."

Forty-second Annual Report: "A high infant mortality rate in a given community implies in general a high death-rate in the next four years of life while low death-rates at both age periods are similarly associated."

An analysis of the causes of the deaths of infants in Huddersfield is of interest. The lowering of the death-rate from 156 to 105 has been attended by a lowering of the rates from diarrhea, bronchitis, convulsions, whooping cough, measles, atrophy, debility and marasmus and an increase of the death-rate from "premature birth" and "all other causes," and pneumonia. The slight apparent increase in pneumonia is due to more accurate diagnosis as between pneumonia and bronchitis.

The apparent increase in deaths from "premature births" Moore holds to be due to fewer diagnoses of debility and marasmus and better diagnosis in general and not to any increase in deaths from any preventable condition.

As to the decline in the birth-rate and death-rate he says: In the last forty-four years the reduction in the birth-rate has been 32.7 per cent. while that of the general death-rate has been 36.8 per cent. but the general death-rate can not fall much farther while there is no limit to the possible drop in the birth-rate.

He quotes the following comment on the causative factors of a high infant mortality rate from the thirty-ninth and forty-second annual reports of the Local Government Board.

Thirty-ninth Annual Report: "Infant mortality is always highest in crowded centers of population; but a high infant mortality can be avoided even under con-

ditions of dense aggregation of population. The chief means for a low infant mortality are efficient domestic and municipal sanitation, good housing and intelligent and painstaking 'mothering.' Infant mortality is highest where filthy privies are permitted."

Forty-second Annual Report: "Breast-feeding is the greatest natural protection against infant mortality. It is not a complete protection, in part because breast-fed infants are often exposed to excessive changes of temperature in air-polluted rooms and in part because mothers frequently give their breast-fed babies other food of an unsuitable character."

Poverty is a direct cause of infant mortality acting in the following ways: (a) Poverty is not infrequently associated with ignorance and carelessness; (b) with these are associated overcrowding and uncleanness; (c) alcoholic habits frequently result from living under conditions of poverty.

Commenting on the above, Moore holds that measures for general sanitation are, comparatively speaking, of minor importance. That which ranks first in his opinion is the "lives and the habits of the mothers in the homes."

[The general consensus of opinion is that a low infant mortality rate goes in hand with a low child death-rate and a low general death-rate.

The argument of those who contend for this view is that not all the sick babies die, and that those who recover are more or less constitutionally enfeebled. The higher the infant mortality rate the higher the infant morbidity rate and, therefore, the greater impairment of the stock. Yet we must not lose sight of the ably presented opinion of Karl Pearson given in *Biometrika*, that a high infant mortality rate goes in hand with a low mortality rate for children between one and four years of age. His opinion is based on closely analytical studies of vital statistics.

The explanation is that a low infant mortality rate permits a large number of weaklings to survive the first year of life only to fall in the next succeeding years. It seems to be that the proof is in favor of those who hold that a low infant mortality rate is accompanied by a low 1-5 years of age mortality rate.—Ed.]

Flies and Diarrhea in Infants. Platt⁶ says that as a potential mechanical transporter of the majority of communicable diseases the fly has few equals. To determine just how important is the fly in transporting infantile diarrhea, the New York Society for Improving the Condition of the Poor and the New York City Health Department conducted a joint experiment in 1913 and again in 1914.

In the summer of 1913, they proved that three times as much diarrhea occurred in a fly-exposed, insanitary area as in one that was fly-protected and cleaned up.

In 1914, they repeated the experiment. They selected three districts—one Italian, one Jewish and one Irish. The three districts were characterized by a high diarrhea death-rate and bad living conditions. There were 1,200 families under observation. The large district was divided into two sub-districts about equal in every particular. There were plenty of nurses and other inspectors.

In one district efforts were made to supply good milk, to fight flies by removing manure, treating manure, removing garbage, rubbish and dirt from the streets, premises and houses, swatting, trapping and catching flies with sticky fly paper.

The babies under one year of age were kept under fly-proof bars. Netting was furnished. The houses were cleaned. In the other district no effort was made to change the method of feeding, the general sanitation or the fly situation.

If it was found that the baby was under the netting on forty out of a hundred visits the record credited the fly protection as good. If behind the netting on 10 to 40 per cent. of the visits the credit was fair. If less than 10 it was poor.

The conclusion was that the fly factor was 1.9. Nearly twice as many babies had diarrhea in the fly-infested area as in the other area under observation. Almost twice as many (1.8) infants had diarrhea in the dirty homes as in the clean ones. The dirty-home factor then was 1.8. By dirt was meant all of these influences in a home which indicate a low sanitary standard, accumulated garbage,

(6) Amer. Jour. Pub. Health, February, 1916.

food exposed on the tables and on the floor, unclean sinks, poor toilets, exposed soiled clothes. The factor for flies and dirt was 2.4.

The factor for artificial feeding alone was 2.4; that for artificial feeding, flies and dirt was 3.5.

Nash⁶ is of the opinion that flies are important factors in causing infantile diarrhea. In his work as health officer of South End he noted that diarrhea in infants and a plague of flies went hand in hand. Later the health officers of Portsmouth and Manchester supported his contention.

[To my mind, Levy, of Richmond, Virginia, has demonstrated that sterilization of diapers is a major factor in a fight against infantile diarrhea. If soiled diapers are responsible for infantile diarrhea, flies must be responsible for the spread of the infection.—Ed.]

Institution Babies. Chapin⁷ found that the death-rate of children under 2 years of age in eleven institutions in New York City for four years was 422.5 per 1,000. The death-rate of children of the same age outside of institutions was 87.4. Chapin concludes that babies can not be properly cared for in institutions. As an alternative he proposes that babies be boarded out on farms and in small cities and towns. This plan will not work except there be ample medical and nursing control of an approved kind. When it is proposed to establish a boarding out unit the first step is to select a neighborhood. The first step in the selection is a survey. The homes which will receive babies are surveyed and if approved, listed. The neighborhood must be healthy and the milk supply good. A high grade physician and nurse or nurses must be available or must be made available.

A small examining office in the city passes on the babies and sends them with nurses to a country home unit. When the capacity of this unit is exhausted a new unit is established. The babies in the homes in the country are visited at short intervals by the physician and nurse. This method has the following advantages. The baby sickness and death rates are lowered. The cost is lowered about 30 per cent.

(6) Medical Officer, May 6, 1916.

(7) Med. Record, June 17, 1916.

[For several years Dr. Chapin has advised that the babies from the poorer districts in cities be boarded in the country during the hot weather. He claimed that the method cost less money and was more effective than the usual city infant welfare methods. Most infant welfare societies have held back because of ignorance and doubt on just the points and details made clear by this paper.—Ed.]

Baby Contests. Baby contests are of great value, Arms⁸ thinks, in the better babies movement. He approves especially of giving prizes to the babies who improve most in a certain period of time. Certain annual fairs in Texas have had baby contests for several years. In Dr. Arms' experience, the parents of children which in one year have made an indifferent showing have heeded the instructions given and the next year their babies have made a much better showing.

An encouraging feature of these contests is that 85 per cent. of the babies are brought in for examination not with the expectation of finding that they are perfect but to find if there are defects and what steps should be taken to correct them.

In Arms' very large experience the most serious physical defect noted has been trachoma. Several unsuspected cases of trachoma have been diagnosed. Several unsuspected cases of hernia have been found.

INSPECTION OF SCHOOL CHILDREN.

Inspection of School Children. Most health departments are satisfied if they can examine every school child during his or her school life. Where only one examination during school life can be made some health officers hold that it is best to confine the examinations to members of the upper grade or grades. The theory is that the recommendations for curative procedures and for changes in habits will have the support of the intelligent subject. On the other hand the majority of health officers hold with Wile¹ that it is best to confine the examination to children in the first grade, doing as many

(8) Southern Med. Jour., June, 1916.

(1) New York Med. Jour., April 15, 1916.

examinations as possible at once upon entrance to school.

Newton² proposes a plan which will appeal to some. He proposes a monthly examination beginning with the first year of school life and extending entirely through it. The applied psychology of his proposal is the stimulus of competition. He would have the students graded on a score card each month. A copy of the card is to go to the parent and the original is to be kept in the school.

Two prizes of \$50.00 each are to be given each year to graduates from the primary school, one for girls; the other for boys. Two prizes of \$500 each are to be given to grammar school graduates, one for girls and one for boys. Cheap but attractive medals are to be provided for those students who stand above a certain minimum on the physical examination score card.

The scoring is done by the teacher and the school inspector. As to many of the points the teacher can judge. Certain points are reserved for the medical examiner. At the end of the primary course or the grammar course, as the case may be, the students who have received a certain number of monthly medals or certificates are eligible for a physical examination in competition for the grand prize.

Newton refers to the plan used by Greenwood in the Blackburn Schools in England. He gave a course of lectures on personal and public hygiene and school inspection for contagion and physical defects to the school teachers. Such as were able to pass a difficult examination on the course were given a certificate and an advance in pay as teachers. These certificate holders gave lectures to the school children on health, personal hygiene, the care of the body, development and contagion. They marked and graded the children on a monthly physical welfare score card.

[The method is a good one but it will prove very expensive as we now look at things. A moderate sized school would require the services of a whole time school inspector. He would be expected to act as school sanitarian as well.

Dr. Newton's suggestions for the subject matter of the

(2) Med. Record, April 15, 1916.

score card do not seem very good. Some are not connected with health or physical condition and others only remotely so. Dr. Hoag's line of questions for a score card are better.—ED.]

Malnutrition in School Children. Wile³ thinks we are a long way from solving the problems of malnutrition. First, we must place the word—malnutrition—on the blanks used by school inspectors. Next, school inspectors must know malnutrition when they meet it and appreciate something of its relation to other conditions, those out of which it grows and those into which it leads.

And, finally, we must correlate malnutrition with inefficiency, symptoms, disease and under-development better than we now do. We must admit that most of the literature on malnutrition is rhetorical and high-sounding rather than exact and scientific. Reports on malnutrition should consist of something more than the numbers who have come breakfastless to school.

Among symptoms of malnutrition are anemia, pallor, harsh and inelastic skins, muscular weakness with spinal curvatures, flat feet, carious teeth, squints, disease of the external eye, lassitude, inattention, twitchings, backwardness and mental dullness. Height, weight and chest measurements are usually below *par*. Valuable information is to be secured from the application of Oppenheimer's formula as follows:

$$\frac{\text{girth of the arm (midway between shoulder and elbow)}}{\text{chest girth (average of inspiration and expiration)}} = \text{at least } 30$$

Wile says that 25 per cent. of our school children fail to attend school 75 per cent. of the time.

Preventable disease is responsible for much of the shortcoming, and malnutrition underlies much of the preventable illness. The New York Committee on the Physical Welfare of School Children found that 26.2 per cent. of the chorea was in children suffering from malnutrition. Malnutrition is responsible for many colds, bronchitis, tuberculosis, enlarged glands and infectious disease. Gastpar of Stuttgart proved that the

(3) New York Med. Jour., April 15, 1916.

Measurements of School Children. Saliva⁴ give the following anthropometric measures of school girls and boys made in Porto Rico:

Average age of boys, 19.07 years.

ANTHROPOMETRIC CHART FOR GIRLS.

Average age of girls, 18.80 years.

Clothing. Cassie,⁵ as a result of her experience as a school inspector, is of the opinion that children wear too many clothes. Even in the warmer months she found children wearing seven or eight layers of clothes. Boys were more sensibly clad than girls. In the case of delicate children with slight physique and poor nutrition the mothers are still more convinced of the need of heavy clothing and the deleterious result of the excessive weight on the shoulders and chest is readily seen in faulty breathing and rounded shoulders.

Warmer and lighter clothing is advised.

School Girls at Puberty. School girls should be scientifically mothered, Warner⁶ thinks, during the years of puberty. As the majority of mothers have no adequate idea of the importance of this problem and usually none whatever of its solution, Warner advises that girls should spend the years of puberty in boarding schools where the girls are supervised by a trained nurse and a woman physician.

INFECTIOUS AND CONTAGIOUS DISEASES.

Facts About Various Forms of Contagious Disease.

Arkin¹ says of measles that it is due to a filterable virus present in the nasal and buccal secretions up to the time of convalescence when its infectivity disappears. The virus is also in the blood. The desquamated skin does not carry the virus. The disease is most contagious before the eruption appears. It is rarely contagious after convalescence is established. The virus resists freezing or drying for twenty-four hours.

He accepts Plotz anaërobic, blood-contained bacillus as the cause of typhus fever. The measures for the control of the disease which he advocates are: (1) destruction of lice; (2) inoculation with a mild type of the disease (Brill's disease); (3) vaccination with Plotz bacillus.

He says that acute anterior poliomyelitis is of three clinical types. (a) Without paralysis; (b) cerebral with

(5) Medical Officer, May, 1916.

(6) Pub. Health Jour., June, 1916.

(1) Amer. Jour. Pub. Health, April, 1916.

spastic paralysis; (c) bulbo-spinal with flaccid paralysis. The disease is due, he asserts, to the small ovoid micro-organism (.15 to .3 mic.) discovered by Noguchi and Flexner. The organism passes through a filter. It is contained in the secretions of the nose and throat and in the intestines. It reaches the nervous system by way of the lymphatics. In considering its epidemiology the possibilities of spread by dogs, flies, stable-flies and the mouth and nose secretions of carriers and cases are to be considered.

He holds that plague is transmitted by the bite of a flea or by direct contact from one animal to another. The bacteria pass from the intestine of the flea and are deposited on the skin. "They are usually scratched into the tissue." Flies, ants and bedbugs may also transmit the bacillus. The bacillus can penetrate the intact skin. The prevention of the disease is entirely a matter of rat elimination.

Arkin considers that the infection of smallpox may be air-borne to a limited degree. Secretions of the nose and throat are highly infectious and are probably the chief agents, he thinks, in causing infection. Noguchi has succeeded in cultivating the virus in the testicle of rabbits apparently in pure culture. This may radically modify the methods of producing vaccine.

In controlling whooping cough, vaccination of susceptible individuals with the Bordet-Gengou bacillus is advised.

In controlling cerebrospinal meningitis he says that isolation of carriers is very important. Secretions of the nose and mouth must be disinfected. Vaccination of persons directly exposed should be carried out.

As to scarlet fever Arkin says that Kessler has demonstrated by experiments with complement-deviating substances that the virus of scarlet fever is in the lymph glands. Other experiments have proved its presence in the tonsils, on the tongue and in the blood and lymphatics. Dick and Henry have isolated an anaërobic bacillus from the urine. The use of vaccines made from streptococci should be of great service in controlling the complications since most of these are due to streptococci.

A Survey of Contagion. A second valuable contribution from London, Ontario, to the study of the prevalence of the ordinary forms of contagion is contributed to the literature of the year by Henderson.²

[This paper, together with another on the same general lines written three years ago by Dr. H. W. Hill,³ should be read by every epidemiologist.—Ed.]

Every school child in London was given a card for itself and one for each child in its home under school age and asked to have them filled out by the parent or guardian. The cards were collected by the school teachers. The cards when filled gave the name and address, the sex, the age and which of the contagious diseases the child had had and at what age. Eight thousand nine hundred and ninety-three cards were returned; of these 8,786 were accepted as satisfactory.

The facts on the cards were tabulated and the cards were left in the possession of the school and health authorities as guides in controlling contagion.

Study of these cards showed that in London practically all the diphtheria is reported. The same statement can not be made as to any other form of contagion except smallpox.

TABLE SHOWING (A) THE ESTIMATED NUMBER OF CASES THAT OCCURRED IN LONDON IN THE YEAR 1915.
(B) THE ACTUAL NUMBER OF CASES REPORTED.

	Chicken-pox.	Diphtheria.	German Measles.	Measles.	Mumps.	Scarlet Fever.	Whooping Cough.	Total.
A	551	128	151	934	644	244	679	3331
B	65	151	0	80	24	38	8	336

Based on the above table, another table showing the mortality rate of measles, scarlet fever and whooping cough was made.

(A) RATE BASED ON REPORTED CASES. (B) RATE BASED ON ESTIMATED ACTUAL CASES.

	Measles.	Scarlet Fever.	Whooping Cough.
A	3.8 per cent.	5.3 per cent.	12.5 per cent.
B	3 per cent.	0.9 per cent.	0.3 per cent.

(2) Amer. Jour. Pub. Health, September, 1916.

(3) Amer. Jour. Pub. Health, September, 1913.

Of the 8,786 cards filled out 1,240 were for children under 5, 6,237 for children 5 to 14 and 1,309 were for children 14 to 20 years of age. The records for children under school age were quite incomplete. For instance, there were only 150 cards for children under 1 year as compared with 721 for children 8 years of age.

Another source of error was the tendency of parents to forget the attacks of disease or their dates. In spite of these defects the tables shows the prevalence of contagion better than any other studies of which the author knows.

TABLE SHOWING THE PERCENTAGE OF THE CHILDREN AT EACH AGE WHO HAD ALREADY SUFFERED AN ATTACK.

	Chicken- pox.	Diph- the- ria.	German Mea- sles.	Mumps.	Scarlet Fever.	Whoop- ing Cough.	Mea- sles.	Total.
Under 1...	.7	0	0	0	0	6.	0	6.7
1	8.	0	0	1.	0	14.5	4.	27.5
2	11.2	.8	1.2	4.8	.8	19.9	10.4	49.1
3	18.8	.8	3.1	5.1	3.9	25.9	22.	82.6
4	22.1	1.5	2.	11.1	5.1	38.6	33.7	112.1
5	27.3	1.7	4.4	9.4	5.3	42.7	35.5	128.3
6	32.6	2.1	6.3	17.3	5.9	55.7	49.7	169.6
7	40.4	2.4	4.7	23.	11.5	58.	60.3	200.
8	39.8	3.1	8.4	27.7	12.2	59.6	71.2	222.
9	46.	5.7	9.9	38.1	10.	60.8	79.5	250.
10	49.2	6.4	9.3	39.8	15.4	65.3	79.3	264.7
11	49.9	7.7	12.9	50.9	18.2	63.2	80.4	283.2
12	50.8	10.9	12.7	50.9	21.7	64.	82.9	293.9
13	51.9	11.6	15.2	51.1	23.6	64.7	85.	309.1
14	57.	11.7	15.3	49.7	26.	60.6	82.6	302.9
15	52.3	13.9	13.1	52.5	26.7	60.	84.2	302.7
16	53.1	14.7	17.2	54.4	28.5	61.8	82.2	311.9
17	55.8	13.3	15.	53.2	26.2	62.2	83.3	309.
18	51.2	17.6	12.9	45.9	24.7	54.7	81.8	288.8
19	58.3	16.7	20.1	60.4	30.6	63.2	84.	333.
20	47.4	17.	17.	51.3	28.9	51.3	82.1	295.

After making allowance for insufficient reporting for the younger age periods Henderson drew up the following table showing the estimated percentages of children who suffered an attack when at a certain age (when in a certain year of life).

Age.	Chicken-pox.	Diph-theria.	German Measles.	Measles.	Mumps.	Scarlet Fever.	Whooping Cough.	Total.
Under 1..	1.1	.1	.2	1.6	.1	.2	2.2	5.5
1	2.9	.4	.6	5.8	.8	.9	6.2	17.6
2	4.3	.6	.7	8.	2.1	1.4	8.	25.1
3	5.4	.9	1.1	9.6	3.4	2.	9.	31.4
4	6.2	1.1	1.2	10.6	4.5	2.5	9.5	35.6
5	6.7	1.2	1.3	11.	5.4	2.5	8.7	36.8
6	6.7	1.2	1.5	11.2	6.2	2.5	7.	36.3
7	5.5	1.2	1.4	9.3	7.	2.5	5.4	32.3
8	4.5	1.1	1.2	7.6	7.1	2.3	4.	27.8
9	3.6	1.	1.1	5.9	6.4	2.	2.8	22.8
10	2.9	.9	1.	4.3	5.5	1.7	2.	18.3
11	2.3	.8	.9	3.1	4.8	1.4	1.4	14.7
12	1.8	.7	.8	2.4	4.	1.1	1.	11.8
13	1.3	.6	.7	1.8	3.3	.9	.6	9.1
14 .....	.9	.5	.6	1.3	2.9	.7	.4	7.2
15 .....	.5	.4	.5	1.	2.6	.6	.2	5.7

Another table shows the estimated percentage of children of a certain age who have already suffered an attack:

Age.	Chicken-pox.	Diph-theria.	German Measles.	Measles.	Mumps.	Scarlet Fever.	Whooping Cough.	Total.
Under 1..	.6	.1	.1	.8	.1	.1	1.1	2.9
1- 2 ...	2.6	.3	.5	4.5	.5	.7	5.3	14.4
2- 3 ...	6.2	.8	1.2	11.4	2.	1.8	12.4	35.8
3- 4 ...	11.	1.6	2.1	20.2	4.7	3.5	20.9	64.
4- 5 ...	16.8	2.6	3.2	30.3	8.7	5.8	30.2	97.6
5- 6 ...	23.3	3.7	4.5	41.1	13.6	8.3	39.3	133.8
6- 7 ...	30.	4.9	5.9	52.2	19.4	10.8	47.1	170.3
7- 8 ...	36.1	6.1	7.3	62.5	26.	13.3	53.3	204.6
8- 9 ...	41.1	7.3	8.6	70.9	33.2	15.7	58.	234.8
9-10 ...	45.1	8.3	9.8	77.7	39.8	17.8	61.4	259.9
10-11 ...	48.4	9.3	10.8	82.8	45.8	19.7	63.8	280.6
11-12 ...	51.	10.2	11.8	86.6	50.9	21.2	65.5	297.1
12-13 ...	53.	10.9	12.6	89.2	55.3	22.5	66.7	310.2
13-14 ...	54.6	11.5	13.4	91.3	59.	23.5	67.5	320.8
14-15 ...	55.7	12.1	14.	92.9	62.1	24.3	68.	329.1
15-16 ...	56.4	12.5	14.5	94.	64.8	24.9	68.3	335.4

Another table shows the estimated number of cases of several forms of contagion per 10,000 total population:

PROBABLE NUMBER OF CASES PER 100,000 POPULATION PER YEAR.

Chicken-pox	95
Diphtheria	22
German measles	26

Measles	161
Mumps	111
Scarlet fever	42
Whooping cough	117
Total	<hr/> 574

[The probability is that reporting of contagion in London is about as good as it is elsewhere. Assuming this to be the fact we see the utter folly of a health department expecting to control contagion when not more than one-ninth of the cases are reported to them. It may be argued that there is no good reason why mumps or German measles should be reported but the argument can not be made as to whooping cough (8 cases of 679), measles (80 cases of 934), chicken-pox (65 cases of 551), and certainly not of scarlet fever (38 cases of 244).

One reason for the poor reporting is found in the low death-rate of certain diseases. For example, it will be difficult to secure reports on scarlet fever so long as the death-rate remains as low at 0.9 per cent.

An interesting table is that which shows the percentage of children suffering from certain diseases at certain ages. In babies no form of contagion is very frequent. Whooping cough leads with a percentage of 2.2. Measles is second, and chicken-pox third. In the second year of life contagion is three times as prevalent as in the first year, whooping cough (6.2 per cent), measles (5.8 per cent.), and chicken-pox (2.9 per cent.) ranking in the order named.

The maximum percentage of contagion is in the fifth year of life (368) in which year measles is first (11 per cent.), whooping cough second (8.7 per cent.) and chicken-pox third (6.7 per cent.).

The statistics do not indicate that schools are the factor in spreading the contagion that we credit them with being. The percentages for the seventh, eighth and ninth year of life are 32.3, 27.8 and 22.8 as compared with 35.6, 36.8 and 36.3 for the three years just preceding school age.

The greatest drop is in whooping cough, 9.5 to 2.8; second that in measles, 10.6 to 5.9. Diphtheria and scarlet fever are about as prevalent in the first three school years as in the three preceding years. When the children

enter school in the seventh year, 52 per cent. of them have had measles, 47 per cent. have had whooping cough and 30 per cent. have had chicken-pox. In contrast only 4.9 per cent. have had diphtheria, and 10.8 per cent. scarlet fever.

We should spend some of the money now spent on school inspection on control of contagion in Sunday schools, kindergartens and in the home.

At 16 years of age 94 per cent. of the children have had measles, 68 per cent. whooping cough and 56 per cent. chicken-pox, an explanation of the comparative infrequency of these diseases in adults.—Ed.]

Method of Controlling Contagion in Schools. Chesley⁴ gives some of the methods employed in the Minnesota public schools for control of contagion.

Each student is provided with a history-of-contagion card. On one side of this card are blank spaces for name, address, age, etc. On the other side is the following list of illnesses—Chickenpox, German measles, diphtheria, infantile paralysis, measles, mumps, pneumonia, rheumatism, scarlet fever, smallpox, tonsillitis, tuberculosis, typhoid fever, and whooping cough. There is also blank space for the vaccination record.

The child takes the card to his mother and she enters opposite the names of the diseases the child has had the dates of the illness. The card is filed with the teacher. If the student is sick with any contagious illness during the school year the facts are entered by the teacher on the card. The teacher also makes appropriate entries of sickness during vacation.

These cards are of great assistance to the school physician and local health officer in controlling contagion. They are also of value in determining what shall be done with children who are absent from school during epidemics.

Chesley illustrates the Minnesota method of controlling scarlet fever by citing the following experience: The state board received word that there was an unreported epidemic of scarlet fever in a city of 5,000 inhabitants. The epidemiologist arrived on the ground Thursday at noon. By night he had met the health officer, the physi-

(4) Amer. Jour. Pub. Health, March, 1916.

cians and the superintendent of schools. He was satisfied that the epidemic was one of a mild form of scarlet fever. Thursday evening was spent in preparing instructions to teachers and blank cards for the pupils. Special cards for absentees, and for close associates of absentees, were made out.

Each teacher made out a card for each pupil in her room. This card gave the name and address whether there was a history of scarlet fever, and when, and whether there had been any recent absences.

Friday morning the pupils were passed in review before the inspector who stood before an open window. The brief examination was of the mouth, throat, tongue, ears, hands and wrists for suspicious signs of scarlet fever. Examination of thirty-five pupils required ten minutes. Each student having any suspicious sign was handed a slip of paper.

This survey of all the pupils, 909 in number, was concluded by 4 o'clock p. m. and an X was entered opposite the name of every student who showed any signs suspicious of scarlet fever at the time of the rapid survey by the state officer.

That night the cards were studied. The next day (Saturday) all absentees, close associates of absentees, and pupils who were given suspicion slips were visited. A spot map of cases and close associates were made. Quarantines were instituted. A meeting of the health authorities, the school authorities and the physicians was called at which temporary arrangements for a school nurse, and a temporary medical school inspector were made, and the duties of health department, school authorities and physicians in controlling scarlet fever were discussed in detail. The epidemiologist left on the Saturday night train. The epidemic was speedily controlled.

At a time when the New York City Health Department contemplated changing certain of its rules for the control of contagion, Hubbard⁵ sent a questionnaire to sixteen city health departments. The replies received are shown in the accompanying table (page 284) :

(5) Jour. Amer. Med. Ass'n., Nov. 20, 1915.

SYNOPSIS OF 1915 QUESTIONNAIRE.

[illegible]

* Procedure in different cities regarding persons exposed to scarlet fever and measles and who are immune by reason of having had either disease and who (a) are engaged in handling dairy or food products, or (b) attend school.
 † Greeter, work after eight days. ‡ Daytimen. § In part only. || No answer.

Exclusion from School of Contacts. Wood⁶ says that in Topeka susceptible children who have been exposed to scarlet fever and diphtheria are excluded from school at once. They are kept out of school for one week after the last exposure.

Contacts with chickenpox are excluded ten days after the exposure and the period of exclusion is seven days.

In German measles contacts are excluded after seven days and for five days; measles, after seven days and for ten days; mumps, after ten days and for ten days; whooping cough, after seven days and for fourteen days.

When there is good inspection service it is possible to shorten the period of isolation of those sick with contagion. The average isolation period for chickenpox in Topeka is 11.7 days; diphtheria 13 days; measles, 11.4 days; smallpox, 10.4 days.

Terminal Disinfection. One of the most debated public health questions of recent years is the efficacy of terminal disinfection. When Chapin began the discussion of this subject several years ago he stood practically alone in advocating that terminal disinfection be discontinued. One by one authorities are swinging into line behind the Providence health officer.

Knause⁷ holds that terminal disinfection is not of enough value to warrant its cost.

In 1913 New York City spent \$52,758.20 on disinfection. The cost of material was \$14,208.20 and of labor, \$38,550. The cost of material is much greater now. The cost of the average fumigation was 85 cents. The cost of material was 9½ cents per thousand cubic feet of air space fumigated.

In Brooklyn terminal fumigation is the rule. Comparing the contagious disease rate of Brooklyn with that of Manhattan there is a difference of 0.09 per cent. in favor of Brooklyn. Or had New York done terminal disinfection it would have prevented four cases of contagion at a cost of over \$13,000 a case.

In case of tuberculosis terminal disinfection supplemented by renovation should be insisted on.

Of more importance than terminal disinfection is

(6) Jour. Kansas Med. Soc., March, 1916.

(7) Amer. Jour. Pub. Health, April, 1916.

mediary disinfection. By mediary disinfection is meant the disinfection of those secretions and excretions which are responsible for the spread of disease.

In New York City, whenever a case of contagion is reported to the health department a hang-up warning card giving specific detailed directions as to how to do mediary disinfection is sent, in some instances to the family direct, and in some to the attending physician. In many instances it is difficult to get the family physician to give, to supervise, or, in some instances, to consent to, the detailed instructions for mediary disinfection. He is very apt to give some very general instructions by word of mouth and let it go at that. In some instances the attending physician has complained to Knause's bureau of the nurse "butting in" when investigation showed that the physician was wrong and the nurse was doing even less than her duty to the patient and the public health demanded.

There are many reasons for ample nursing and inspection service but the best of them is the need of adequate mediary disinfection. Study of the date of development of secondary cases of contagion shows that most infections occur as the result of faulty mediary disinfection.

TYPHOID.

Technique of Typhoid Vaccination. For immunization against typhoid Gay¹ recommends three injections of the sediment of a dried ground sensitized culture of several local strains of the typhoid bacillus mixed together, given at two-day intervals each dose containing 750 million bacteria.

Vaccination Against Typhoid. Sawyer² has found antityphoid vaccination less satisfactory among civilian populations than it has proved in armies and especially in the U. S. Army.

The principal reason for the poorer showing is the relative intensity of the infection to which the civilian is subjected. When he drinks infected water or milk it is liable to be grossly infected.

(1) Harvey Lectures, 1914-15.

(2) Jour. Amer. Med. Ass'n., Oct. 23, 1915.

Through the California Board of Health over 8,000 civilians were vaccinated in the year preceding the writing of the report. The vaccine used was the Gay-Claypole sensitized vaccine. The failures to produce immunity were 5 per 1,000 vaccinations.

The sensitized vaccines seemed a little more efficient than the non-sensitized. The reactions from the two varieties of vaccine were about the same.

In the discussion which followed H. J. Nichols disagreed with some of Sawyer's conclusions. The percentage of failure to establish immunity in the army is almost *nil*. In 1914 there were but seven cases of typhoid in the army. Of these four men developed typhoid immediately after being taken into the army. Three had been vaccinated or partially vaccinated. One was vaccinated five years before and one two years. One had had two doses of vaccine two years previously.

Nichols thought that the better results in the army as compared with Sawyer's figures were due to better vaccine and not to less exposure to typhoid.

The men in the army receive three doses of a vaccine which is less than four months' old. Much commercial vaccine is nearly a year in age. On the other hand, it seems fairly well established that sensitized vaccine is of value in aborting a developing typhoid.

Typhoid Inoculation of the Soldiers. Alexander Fleming³ reviews the subject of typhoid and paratyphoid inoculation based on figures from the British forces in the near East.

The vaccine used by the British Army is made by growing typhoid bacilli on agar or broth. An emulsion is made of the bacilli in normal salt solution. The bacilli are killed at 53° C. after which sterility tests are made by plating some of the vaccine aërobically and anaërobically.

The official French vaccine is made from agar cultures, sterilization being effected by ether. Though the claim is made for the French vaccine that the reaction is diminished, French officers who have been interviewed disclaim this and express a preference for the British vaccine.

(3) Practitioner, January, 1916.

Injection is made subcutaneously in the chest about two inches below the middle of the clavicle. Two doses are administered, one of 500 millions and another of 1,000 millions ten days later. With a sterile syringe the chances of a septic injection are *nil*. Local and general reactions are variable.

The duration of the immunity is difficult of determination but it has been shown that even after all demonstrable immune substances had disappeared from the blood the individuals responded much more quickly to another inoculation. After inoculation the maximum case incidence in India is the third year of service as compared with a maximum during the first year of service during the pre-inoculation era. This would seem to show that immunity lasts at least two years.

Whether a mixed vaccine of typhoid and paratyphoid should be used is a question which has repeatedly cropped out. As the mortality of paratyphoid in the expeditionary force in France is only about 1 per cent., the problem of paratyphoid is not a serious one. Leishman's idea prevails that the admixture of paratyphoid would weaken the efficacy of the typhoid vaccine.

The argument that increased efficiency of general sanitation is responsible for the diminution of typhoid fever is of theoretic interest only.

Sanitation, prophylaxis and the careful elimination of "carriers" taken together are responsible for the fact there are only 30 cases of typhoid fever under treatment in the British military hospitals in France.

The method of typhoid vaccination employed in the Canadian Army is described by Porter.⁴

A small area just below the clavicle is painted with tincture of iodine and 250 million dead bacteria are injected. From four to ten days later a similar injection of the same number is given. From four to ten days later still a third injection, this time of 500 million, is given, making a total of 1 billion dead bacteria.

Up to May 1st 42,200 soldiers had been inoculated, of whom 107 had reactions serious enough to send them to the hospital.

One-half of the admissions were during the summer

(4) Public Health Journal, June, 1916.

months. At the present time, the injection consists of a mixture of typhoid and paratyphoid bacilli.

Immunization by Mouth. Tremolieres, Loew and Maillart⁵ found that persons could not be immunized against typhoid fever by oral administration of typhoid vaccine. Tests of the blood of persons who had swallowed vaccine gave no evidence that they were immunized. Tests were made for agglutinins, precipitins, complement deviation and the opsonic index was taken. All the tests were negative.

Lignieres⁶ warns that vaccines of paratyphoid organisms made from old laboratory stock cultures are liable to be ineffective. Such strains lose their virulence after a few generations.

A Typhoid Vaccine With Mild Reaction. Dr. B. Johan⁷ complains that injection of the popular antityphoid vaccine, Pfeiffer-Kolle, is often followed by very disagreeable reactions. These consist of chills, elevation of temperature over 40° C. (104° F.), vomiting, diarrhea and headache, disappearing a few hours after the injection. He has endeavored to avoid all these without lessening the value of the vaccine.

Johan came to the conclusion that the disagreeable phenomena could not be due to the albumin substances in the bacterial bodies (and therefore not dissolved in the liquid) as resorption of these bacterial bodies could not possibly take place so soon. Only two poisons can be the cause of the acute intoxication—either the exotoxins yielded during the growth of the bacteria, or the endotoxins liberated during the preparation of the vaccine through the decomposition of a number of bacilli.

Johan believes that the immunity is not antitoxic but bacteriologic. He does not believe that the disagreeable reactions represent anaphylactic phenomena for, he can not imagine that all the men who experience severe reactions have gone through typhoid fever. If it all meant an anaphylactic phenomenon produced by bacterial albumin it could not be lessened by a method which in his experience prevents reaction.

(5) Bull. de l'acad. de Méd., Oct. 26, 1915.

(6) Bull. de l'acad. de Méd., Nov. 2, 1915.

(7) Deutsche med. Wochenschr., July 8, 1915.

Johan washes the dead bacilli in saline solution and then removes them by centrifuging. The washed toxin-free dead bacilli are suspended in saline solution containing 0.25 per cent. carbolic acid.

Johan has a record of over 2,000 adults and children vaccinated in none of whom has the reaction been so intense as is observed with the Pfeiffer-Kolle vaccine.

Johan claims the following advantages for his vaccine:

1. Immunization can be administered without lessening the earning capacity of the vaccinated persons.

[In an army this would mean a tremendous advantage, especially in times of mobilization and actual campaign.—Ed.]

2. There is the possibility of injecting larger quantities of bacilli. According to Friedberger this is quite an advantage for he believes that one injection of large quantities produces a higher degree of immunity than do two small injections.

3. While it is best to administer two large doses in case of emergency one injection will suffice to bring about a certain degree of immunity.

Comparative Typhoid Vaccination. Dr. M. V. John⁸ reports a large series of comparative vaccinations with diverse vaccines and, based on his observations, endorses Johan's vaccine. With the Pfeiffer-Kolle vaccine he has occasionally seen intense reactions which resemble attacks of mild typhoid fever. How long the agglutinins will circulate in the blood of the vaccinated no one can tell as yet. In soldiers examined four months after vaccination the blood serum agglutinated in dilutions of from 100 to 200. It is regretted that it was not known whether their blood agglutinated before the disease at all and, if so, in what dilution. Concluding, John says that Johan's vaccine is better tolerated than Pfeiffer's, that with it agglutination was obtained from twelve to fifteen days after the second vaccination. He recommended that three injections be given with the washed vaccine of Johan.

Vaccination With Mixed Vaccines. Castellani⁹ advocates the use of combined vaccines, rather than multiple

(8) *Deutsche med. Wochenschr.*, July 8, 1915.

(9) *Med. Officer and Rep. Advis. Com. Trop. Dis., Res. Fund.*

vaccination each time with a separate vaccine. The various combined vaccines with which he has experimented are:

1. Typhoid and paratyphoid, *A* and *B*.
2. Typhoid and Malta fever.
3. Typhoid, paratyphoid *A* and *B* and Malta fever.
4. Typhoid, paratyphoid *A* and *B*, *Bacillus asiaticus*, *Bacillus columbensis*.
5. Typhoid, paratyphoid *A* and *B*, *Bacillus asiaticus*, *Bacillus columbensis*, Malta fever.
6. Typhoid, paratyphoid *A* and *B*, *B.dysenteriae*, Kruse-Shiga, *B.dysenteriae* Flexner, *B.dysenteriae* Hysy, *B. dysenteriae* Flexner—like No. 1 and No. 2.
7. Cholera, plague.
8. Cholera, plague, typhoid, paratyphoids *A* and *B*.
9. Cholera, plague, typhoid, paratyphoids *A* and *B*, Malta fever.

The cultures used consist of carbolized emulsions of agar cultures in normal salt solution without heating. No. 1 is also prepared by heating to 53° C.

There is not much reaction after the use of any of these vaccines except in the case of those containing plague bacteria. When a mixed vaccine is given a specific agglutinin is formed for each bacterium except in the typhoid-dysentery vaccines. The agglutinin, however, is not so strong as that formed when a single species is used as a vaccine.

Typhoid Carriers Among Convalescents. Experiences in attempting to clear a certain district of typhoid fever preparatory to the incoming of troops, are detailed by Stokes and Clark.¹⁰ All cases of the disease were brought under control with a view to the prevention of development of carriers.

In an examination of 810 convalescents they found 4 per cent. became temporary intestinal carriers, 4 per cent. temporary urinary carriers, 1.6 per cent. chronic intestinal carriers and 0.24 per cent. chronic urinary carriers. Patients not excreting bacilli after three months from the onset of illness were called temporary carriers. If bacilli were excreted after the three months' period the carriers were said to be chronic.

(10) The Lancet, March 11, 1916.

Klengers' figures on 604 convalescents were:

Temporary intestinal carriers, 11 per cent.; temporary urinary carriers, 1.7 per cent.; chronic intestinal carriers, 1.0 per cent.

Women become carriers much more frequently than men.

Vaccination of Nurses at Bellevue. Brannan¹ gives his experience with vaccination of the nurses of Bellevue and allied hospitals against typhoid. The advisability of immunizing the nurses in hospitals was brought to the attention of Brannan by Spooner who based his conclusions on experiences in Massachusetts General and other hospitals in the vicinity of Boston.

In the more than three years since free vaccination has been optional among the Bellevue nurses, not one of the several hundred who have been vaccinated has had the disease. Of the few who have declined to be vaccinated four have had typhoid.

Some nurses have been vaccinated while they were nursing typhoid cases. None of them contracted the disease. This rather leads Brannan to the opinion that the danger that a negative phase is liable to cause infection of those exposed to typhoid while being vaccinated is not great.

Martha Wollstein found that after vaccination immune bodies in the blood increased for two months after which they decreased. Of nineteen vaccinated persons the blood of fifteen had no immune bodies after thirteen months. Wollstein therefore thinks that typhoid vaccination should be done about once a year. Brannan agrees with Russell (and disagrees with Wollstein), that typhoid vaccination need not be repeated until after longer intervals—three years—and there is some reason for hoping that protection may be lifelong.

In the Bellevue experiences vaccination was not found to stimulate the development of tuberculosis, arthritis or other diseases.

Vaccination of nurses is now compulsory in Mt. Sinai, St. Luke's and Roosevelt hospitals. It is optional at St.

(1) Amer. Medicine, November, 1915.

Vincent's, German, New York and Bellevue—all in New York City.

The method of vaccination against typhoid used by J. W. S. McCollough² consisted in three separate inoculations of dead typhoid bacteria—250,000 the first two doses and 500,000 for the third. The interval between injections was five days.

McCollough's observations were on Canadian troops recruited for service in Europe; 75 per cent. of the first contingent of 33,000 were vaccinated. Of the first 1,100 inoculated—in a single day—thirty-seven were on sick call the next morning. Of these thirty-seven six had a temperature over 100 F., four had headache but no fever, one had diarrhea. Four remained in the hospital all day and one stayed through the following night.

No other unpleasant experiences were noted.

Lower Typhoid Rates in Cities. The improvement in the typhoid rate of American cities³ during the past ten years has been phenomenal. In 1915 seven of the nine American cities with a population of over 500,000 had a typhoid death-rate of less than 10 per 100,000 living. The rates of Chicago, Boston and New York were 5.4, 5.5 and 6 respectively as compared with rates of 15.8, 16 and 13.5 respectively for the five years, 1906-10.

Of the ten cities with 300,000 to 500,000 population eight had typhoid rates under 10. The leading cities were Newark, Seattle and Milwaukee with 2.5, 2.5 and 4.5 respectively as compared with 14.6, 25.2 and 27 for the years 1906-10.

A third group, 200,000 to 300,000 contained ten cities. Of these seven had a rate under 10 and the leaders, Portland, Jersey City and Rochester had 5.2, 5.6 and 6 as compared with 23.2, 12.6 and 12.8 for the five years 1906-10.

In the group of cities with 125,000 to 200,000 inhabitants five of the fourteen had rates under 10. Omaha, Paterson and Worcester had rates of 3.7, 5.1 and 5.6

(2) Amer. Medicine, November, 1915.

(3) Jour. Amer. Med. Ass'n., April 22, 1916. The previous article on this subject appeared in the same journal April 17, 1915, and an abstract was published in Practical Medicine Series, 1915, Vol. VI, pp. 7-12.

as compared with 40.7, 19.3 and 11.8 for the five years 1906-10.

In the cities with 100,000 to 125,000 population six of seventeen had rates under 10. Cambridge, Bridgeport and Tacoma had rates of 1.8, 5.1 and 5.5 respectively.

Fifty-seven cities in which 23,621,302 people lived in 1915 had a typhoid mortality rate of 8.65 as compared with a rate of 19.59 in 1910. The total number of deaths in these cities from typhoid was 2,045 as compared with 4,114 for a population of 20,995,035 in 1910.

Typhoid Due to Eating Oysters. An epidemic of typhoid fever due to eating oysters is reported by Brooks.⁴ There were fifty cases in the epidemic. He proved that water, milk and flies were not the cause. None of the cases occurred in poor people. Thirty-eight gave a history of having eaten oysters at just the right time in relation to the development of the disease. Some ate oyster stew but the method of cooking oyster stew does not sterilize the oyster. The milk is brought to a boil and then the oysters are dropped in and the stew is removed from the fire. If the oysters are brought to the boiling temperature throughout their bodies they are made tough and unpalatable. In consequence oyster stew is not sterile.

The oysters came from two jobbers, though they were purchased from several retailers. The jobbers got them from many small shuckers some of whom got their oysters from wholly unsupervised beds.

Brooks is sure of his ground in stating that no cause other than oysters was responsible for this epidemic. He is reasonably certain that the etiologic factor was oysters.

Typhoid Due to Eating Watermelons. S. E. Blatteis⁵ reports an epidemic of typhoid due to eating infected watermelons. The melons were found floating in New York harbor. They were punctured and infected salt water had soaked into the meat. The children and some of the adults who ate the melons developed gastro-

(4) Jour. Amer. Med. Ass'n., May 6, 1916.

(5) Med. Record, Dec. 11, 1915.

enteritis from one to three days later. Twelve days after eating the melons cases of typhoid began to develop among both those who had had, and those who had not, had bowel disturbance.

Blatteis was not able to find a record of other cases of typhoid due to eating watermelons.

Blatteis reports some details as to two other epidemics. A case of typhoid was carried to a fly-infested hospital in which there were no proper nursing facilities; 94 cases of "fly and finger" typhoid developed from this case.

Another epidemic started from an ice-cream parlor which employed a typhoid carrier who had never had typhoid.

The investigation of sources of infection for typhoid in New York City shows that milk is by far the greatest offender with water, flies, and carriers as other sources. Oysters and shellfish play a minor rôle and vegetables and fruit are still less important.

TYPHUS.

Inspection of Immigrants for Typhus and Lice. Kantor⁶ does not think our inspection and quarantine methods against typhus are entirely correct. Isolation of immigrants sick with typhus, and their contacts, will not prevent the introduction of the disease into a country. He reports some cases due to infected lice transported past quarantine by immune carriers.

The efforts at quarantine should be directed against lice not individuals. He thinks perhaps infection by lice transported by immune carriers is responsible for the prevalence of Brill's disease in this country.

On the other hand, he thinks immunity to typhus through an attack of Brill's disease may permit an individual to carry infected lice with safety to himself but with danger to the community.

His advice is that all immigrants from typhus infected countries should be made "louse-free" before being permitted to enter the country.

(6) Jour. Inf. Dis., November, 1915.

PELLAGRA.

Cause of Pellagra. Economic Aspects. Nesbitt⁸ holds:

1. There is no existing relation between soil pollution and the incidence of pellagra.

2. Close supervision of all cases, disinfection, fumigation, isolation, and all the other usual means of controlling infection have no influence on pellagra incidence.

3. Business depression, lack of employment, a limited market for products and increased price of food with consequent increase of indigence increase the incidence of pellagra very definitely.

Between 1912 and 1915, New Hanover County, North Carolina, improved its general sanitation very materially. A sanitary survey was made jointly by the U. S. Public Health Service and the North Carolina Board of Health in 1914, and in 1915 it was repeated. On the government score card the rating of this county improved 45 per cent. in the second year over that of the first year. In 1915 only twelve homes in the entire county were without properly screened and properly built privies. The water supply was better. The people were well informed on sanitation and public hygiene. Coincident with these changes the death-rates improved between 1911 and 1915 as follows:

General death-rate 29.43 fell to 16.4. Children under five, death-rate 1123.03 to 474.2 (per 100,000).

Enterocolitis death-rate (per 100,000) 411.64 to 80.

Typhoid death-rate (per 100,000) 100.98 to 9.2.

Percentage of deaths due to communicable disease, 54.16 to 30.20.

But while these improvements were going on the pellagra death-rate (per 100,000) rose from 38.83 to 64.6.

This loss Nesbitt attributes to high cost of living and hard times. In the surveys, as was to be expected, Nesbitt found many mild, unreported and hitherto unsuspected cases of pellagra.

Diet as a Cause of Pellagra. Grote⁹ believes that pellagra is due to a badly balanced diet. His opinion

(8) Jour. Amer. Med. Ass'n., Feb. 26, 1916.

(9) Southern Med. Jour., March, 1916.

is based in part on a comparison of two mining camps in Walker County, Alabama. There were no cases of pellagra in Camp A while in Camp B there were 20 cases.

The essential difference between these two camps was in the quality of the food used. In Camp A most of the inhabitants had good cows. There was plenty of milk, meat and good vegetables. In Camp B there were no cows. The people lived largely on cornbread, molasses, brown gravy and white meat.

Lavinder¹ says: "At present the most hopeful outlook for etiologic studies seems to be in approaching the disease from the dietetic side."

Pellagra and a Bread Diet. Voegtlin, Sullivan and Meyers² assert that the changed character of the bread used in the United States during the last fifty years is responsible for the increase in pellagra. Prior to 1880, corn and wheat were simply crushed between stones. The coarser particles of bran were sifted out and the balance was used. The breads contained the vitamins of the grain as well as most of its other food ingredients. The old-fashioned corn meal and wheat flour contain all of the vitamins. The new-fashioned meals and flours as compared with the old-fashioned products keep better and make bread that is more attractive in appearance, but they contain less protein, fat and ash, as well as less vitamins.

Furthermore, the increased use of soda in cooking has increased the tendency to pellagra.

Recent experiments by Sullivan and Voegtlin³ prove that where foods mixed with alkali are cooked, the vitamins are destroyed. If the soda in dough is fully neutralized by acid (from sour milk or other sources) no harm results, but if the dough is alkaline, the vitamins are destroyed.

The authors attribute the increase in pellagra in this country to the following factors: First, the reduction in the diet of vitamine-rich foods (fresh milks, eggs and meats); second, the introduction of highly milled cereals;

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- (1) Southern Med. Jour., April, 1916.
 - (2) Public Health Reports, April 14, 1916.
 - (3) Amer. Soc. Biol. Chem., 1916, xvi.

and, third, the use of baking soda in bread and vegetables; many people, in order to cook quickly, add soda to vegetables.

The same authors⁴ in a previous communication called attention to an epidemic of pellagra in France in 1820, which resulted from the poverty occasioned by the Napoleonic wars. When economic conditions improved the disease disappeared.

Sydenstricker⁵ proves that the increase in pellagra in the United States has been coincident with the rise in the cost of food—without a parallel increase in the rate of wages. This has resulted in a decrease in the use of milk, eggs and meats, especially by poorer people.

[It can be accepted as proven that pellagra results from the prolonged and almost uninterrupted use of foods deficient in certain elements. It is just as fully proven that pellagra in its earlier stages can be cured by changing the diet to one richer in the needs of food elements. It is at least possible, in fact, it is probable that the change in the character of bread consumed is one factor. With the establishment of these facts the pellagra situation becomes essentially one of economics.—Ed.]

Whole Wheat Bread. Romano⁶ advocates the use of bread made from whole wheat. He thinks that bread should not be leavened. The eating of white leavened bread is wrong from both the hygienic and economic viewpoints. Leavened bread is too soft and saliva does not penetrate it well. In spite of the heat to which it is subjected in cooking not all of the yeast ferments are destroyed and some yeast action is continued in the gastro-intestinal tract.

White leavened bread, therefore, induces indigestion. It tends toward constipation. From it valuable food elements are missing. Economically it is wasteful in that parts of the berry rich in protein and in mineral foods are not used.

PNEUMONIA.

Deaths From Pneumonia. The following table is cited by Dublin¹ to show the very great increase in

(4) Jour. Amer. Med. Ass'n., 1914, lxiil, p. 1095.

(5) Public Health Rep., Oct. 22, 1915.

(6) Gior. d. r. Soc. Ital. d. Igiene, July, 1915.

(1) Amer. Jour. Pub. Health, May, 1916.

deaths from pneumonia and influenza in different parts of the United States in December, 1915, and January, 1916, as the result of the epidemic which prevailed in those months:

City.	Deaths from Influenza.		Deaths from Lobar Pneumonia.	
	Dec. 1915-	Dec. 1914-	Dec. 1915-	Dec. 1914-
	Jan. 1916.	Jan. 1915.	Jan. 1916.	Jan. 1915.
Total	1091	143	3021	1733
Baltimore	57	12	219	110
Cincinnati	81	2	105	84
New Orleans	97	44	35	29
New York City.....	494	62	2067	1207
Philadelphia	324	20	564	272
Providence	38	3	31	31

Bacteriology. During the last year or two there have been a group of discoveries relative to pneumonia which promise to be revolutionary. Dochez and Avery² divide pneumococci into four groups. Groups 1, 2 and 3 have so many points of similarity that they are said to be homologous, though they differ very much among themselves.

In 80 per cent. of the cases of pneumonia the pneumococcus found belongs to one of these three groups.

Group 4 is composed of pneumococci differing so much from those in the other three groups that the members of this group are said to be heterogenous.

In the winter of 1912-13, the cases of pneumonia examined bacterially were distributed among the different groups as follows:

	Per cent.
Group 1	47
Group 2	18
Group 3	13
Group 4	22

In 1913-14 the distribution was as follows:

	Per cent.
Group 1	30
Group 2	39
Group 3	8
Group 4	23

(2) Jour. Exp. Med., February, 1915.

Within recent months reports of groupings corroborative of those of Dochez and Avery have come in from widely different parts of the world.

The rank of the organisms of the different groups in virulence is as follows: Most virulent, three; second, two; third, one; least virulent, four.

The preventive medicine significance of these findings is as follows:

Pneumococcus of Group 4 is the organism commonly found in the mouth. When pneumonia is due to auto-infection this organism is the infecting agent. This kind of pneumonia is mild in type and relatively infrequent. 80 per cent. of pneumonias are due to organisms of Groups 1, 2 and 3. During a pneumonia of a severe type the pneumococcus of Group 1, 2 or 3 are found in the sputum. They persist in the sputum for from twelve to ninety days after recovery. They are also found in the mouths of those in close contact with pneumonia. Therefore, 80 per cent. of the pneumonias are caught from cases of pneumonia or contacts. Under this view pneumonia cases should be reported and isolated for a period of at least three weeks.

Avery³ reports finding three groups of Group 2. Dochez and Avery⁴ report that at the time of the crisis in pneumonia an antipneumonic substance is developed in the serum. This substance retards the growth of pneumococci and also of some of its other functions.⁵

Control of Pneumonia. Dr. David Riesman,⁶ in the course of a progress report of the Philadelphia Pneumonia Commission, said that in the present state of information or lack of information pneumonia as an epidemic disease is uncontrollable. The view that a man contracts pneumonia from systemic infection by the organisms which infest his mouth when he is well is untenable. These pneumococci are innocuous to him. Pneumonia is contracted from without.

(3) Jour. Exp. Med., 1915, Vol. 20, p. 804.

(4) Jour. Exp. Med., January, 1916.

(5) See also Cole, Vermont Board of Health, 1915; New York Med. Jour., 101-159; New York Health News, February, 1916; Pub. Health Jour., March, 1916, and Nicholl, New York Health News, February, 1916, and Public Health Journal, March, 1916.

(6) Jour. Amer. Med. Ass'n., Feb. 26, 1916.

TUBERCULOSIS.

Diagnosis of Tuberculosis. Thompson⁷ says that tubercle bacilli are not found in the sputum in 65 per cent. of the cases of consumption. We must, therefore, have some means of diagnosing early consumption other than microscopic examination of the sputum.

LEPROSY.

Diagnosis of Leprosy. Nakajo and Asakura⁸ report results in using a means of diagnosing leprosy, especially when the diagnosis between leprosy and syphilis is difficult.

An injection of old tuberculin is given. If the reaction is positive the diagnosis is certain. If there is a positive complement-fixation with old tuberculin and also with Wassermann antigen the disease is probably leprosy.

HAY FEVER.

Hay Fever and Public Health. Dr. William Scheppe-grell⁹ has long contended that the control of hay fever was a public health measure of considerable importance. In the first place hay fever is the cause of great loss in human efficiency. In the second, it occasions the expenditure of large sums of money. In the third place, it is caused by the growth of certain weeds, which growth can never be controlled except by community action.

The measure of prevention recommended is the enforced cutting of weeds either by governmental action or else on private property through the stimulus of public opinion. Scheppe-grell says: "The cutting of weeds in the neighborhood of the patient's residence is of first importance." When a person develops hay fever he is given a glycerine plate to collect the infecting pollen for identification. An inspector is then sent out to look for

(7) Jour. Ark. Med. Soc., November, 1915.

(8) Jour. Inf. Dis., July, 1915.

(9) Jour. Amer. Med. Ass'n., Sept. 16, 1916.

the offending weeds for three squares in each direction from the patient's residence. The lots on which the offending weeds are growing are reported to the health officers for prosecution and to secure immediate cutting.

Two varieties of pollens are responsible for hay fever. The spiculated variety causes what Scheppegegrell calls direct hay fever and the non-spiculated variety high in protein causes indirect hay fever. Unless a pollen is wind-borne there is not much possibility that it will cause the disease.

The size of the pollen is a very important factor in determining whether the pollen will be borne by the wind. It is estimated that 85 per cent. of the autumnal hay fever of Kansas is due to ragweed. Ragweed pollens are from 15 to 20 microns in diameter and are covered by spicules from 2 to 2.8 microns in length. These pollens are borne long distances by the wind. They cause hay fever by mechanically irritating the mucus membrane of the nose.

Next in importance is cocklebur. The cocklebur (*Xanthum americanum*) has pollen 36 microns in diameter and with spicules .7 microns long. A wind 20 miles an hour will only carry cocklebur pollen 700 feet as compared with 3,015 feet for the pollen of ragweed (*Ambrosia elatrive* and *trifida*). The spicules being shorter the irritation is less.

Other spiculated pollens causing hay fever are wild elder (*Iva ciliata*) (7 microns), poverty weed or marsh elder (*Iva axillaris*) and false wormwood (*Parthenium hysterophorus*). The pollen of sunflower is also spiculated and has long spicules, 5.6 microns, but the size of the pollens (40 microns) is so great that the wind does not transport it. It causes hay fever when directly inhaled as is the case with golden rod, ironweed, rosin weed, marshmallow, horseweed, sow thistle, dandelion, sneeze weed, shasta daisy and black-eyed Susan.

The non-spiculated pollens cause indirect hay fever through the protein absorbed from them. Among the smooth pollens which sometimes produce hay fever are corn, rye, rice and all the grasses. The pollen of corn is so large and heavy that it causes little or no trouble.

The method of testing for protein in pollen is to apply

a drop of iodine solution to the pollen on a glycerine-covered glass slide or cover.

Formula of solution: Iodine crystals, 5 grams; potassium iodide, 10 grams; distilled water, 1 fluid ounce.

The pollen grains are examined by reflected light using a white porcelain reflector. Pollens without protein show only yellow-brown stains. Pollens with a low protein content stain violet. Among these are careless weed, yellow dock, and goosefoot. These do not cause hay fever. Pollens of the grasses stain light blue to almost black. These produce indirect hay fever.

DIPHTHERIA.

Controlling Diphtheria in a School for the Blind. Stovall,¹⁰ making use of the Schick test, inoculation of reactors with 1,000 units of antitoxin and throat swabs, was able instantly to control a threatened epidemic of diphtheria in a school for the blind.

A case of diphtheria in the school caused four secondary cases in spite of throat cultures, isolation and the other usual procedures. At this point the method of control was modified. Every student and teacher was given a Schick test. The reactors were injected with 1,000 units of antitoxin.

Of the ninety-one tested by the Schick test forty-four reacted positively and ten doubtfully. Of the ten, five were given antitoxin. A week later the five who were not given antitoxin developed diphtheria. No more cases developed.

The throats of all students were cultured. In six, diphtheria bacilli were found. Five were among the reactors. These had antitoxin. Their throats cleared quickly after the antitoxin. One was a non-reactor. Clearly he was a carrier. An injection of antitoxin failed to clear his throat.

Schick Test. Park and Zingher¹ say that the Schick test should be applied as a routine procedure in measles and scarlet fever pavilions of hospitals. The reactors should be immunized by injecting 1,000 to 2,000 units

(10) Jour. Amer. Med. Ass'n., Mar. 11, 1916.

(1) Amer. Jour. Pub. Health, May, 1916.

of antitoxin and re-immunized in three weeks if they remain in the hospital so long. In this way cross infections with diphtheria can be prevented and antitoxin bills be lessened.

The Schick test continues to hold its position. The positive reactors are nearly always immune to diphtheria. Most of the pseudo-reactors in adults, but not in children, are immune.

The Schick test is used with advantage in testing the immunity which results from the von Behring toxin-antitoxin injection.

The Schick test is of great help in clearing up those cases in which there are bacilli in the throat or nose, but in which there is a possibility that the symptoms are due to streptococcus or other bacteria. For example, diphtheria carriers sick of an acute streptococcus sore throat.

The Schick test teaches us anew the need of early use of antitoxin given for therapeutic purposes; that an intravenous injection of antitoxin is able to neutralize diphtheria toxin six hours after its absorption, and that a day's delay in the administration of antitoxin may mean that a fatal dose of toxin is fixedly bound to the tissues and not even antitoxin can release it or neutralize it.

Park and Zingher say that the immediate effects following vaccination by the von Behring method have not been satisfactory. The ultimate effects have been.

Treatment of Diphtheria Carriers. Friedberg² is of the opinion that removal of the tonsils is the best method of cleaning up the throats of diphtheria carriers and convalescents in whom the organism tends to persist. Some of Friedberg's cases had used kaolin without success.

Convalescents probably should wait two or three weeks after clinical recovery before being operated on. For the purpose of cleaning up the throats of convalescents from, and carriers of, diphtheria, Ott and Roy swabbed the mucus membranes every 48 hours with iodized phenol (carbolic acid) 60 per cent., iodine crystals 20 per cent. and glycerine 20 per cent.

(2) Jour. Amer. Med. Ass'n., March 11, 1916.

SCARLET FEVER.

Scarlet Fever and Fleas. Hamer³ thinks that vermin and especially fleas contribute to the spread of scarlet fever. The curve of fly prevalence and infantile diarrheas run parallel in London as he pointed out in 1909. The maximum of the scarlet fever curve lags from three to eight weeks beyond that of the flea curve.

A study of the epidemiology of scarlet fever shows there must be an unknown factor. First, the supposed bacterial causes of this disease can not be made to cause it artificially. Second, there is the tendency of scarlet fever to cling to certain schoolrooms; and the inadequacy of the theory of infective human carriers to account fully for the phenomena observed.

Third, there is the response to variations of atmospheric temperature and variations in atmospheric temperature can not get at the organisms within the body. All these shortcomings of other theories lead Hamer to the belief that there must be an unknown factor and this he thinks may be fleas.

In looking for scarlet fever one must pay attention to: (1) children *under* school age in the *poorest* areas; (2) children *of* school age in the *less poor* areas; (3) children *over* school age in the *good* residential districts.

The explanation is as follows: In the very poor areas babies in arms are subjected to the disease by reason of the crowding and poverty. Also in such areas a large percentage of the children are in elementary schools where they contract scarlet fever. Many of the children of school age in such areas have already had scarlet fever.

In the middle class areas, the children are well enough protected to prevent them from contracting scarlet fever until they reach the regular schools at the regular school age.

In the high-grade residential areas many of the children go through school without having scarlet fever and therefore the incidence of the disease among older children is higher.

(3) Med. Officer, May 27, 1916.

SEPTIC SORE THROAT.

Rosenow and Moon⁴ report an epidemic of septic sore throat in which the streptococcus isolated had many points of resemblance to an organism which causes rheumatism. Rheumatism or rheumatic pains was a prominent clinical feature of this epidemic. The epidemic stopped at once when the milk was pasteurized.

SMALLPOX.

Methods of Diagnosing Smallpox. Force⁵ offers an experience confirming the value of the Force-Beckwith method of diagnosing smallpox.* A patient held in quarantine for smallpox gave a history of full use of bromide and the possibility that the eruption was due to bromide was raised. Some of the pus from a pustule was brought to the laboratory. It was diluted with salt solution and introduced intradermically into a rabbit immunized against smallpox. At the same time the other side of the same rabbit was inoculated with a commercial vaccine virus of low potency. Twenty-four hours later the points inoculated with the pus from the patient showed nothing. Those inoculated with the vaccine virus showed an areola 1 c.m. in diameter with a central yellowish papule. This faded after 24 hours. A second rabbit similarly treated reacted in the same way.

A non-immunized rabbit inoculated on one side with pus, and the other side with weak vaccine, showed no reaction on the pus side and a very feeble reaction on the vaccine side. Two days after the pus was taken from the patient Dr. Force telegraphed the local health officer to raise the quarantine. The rash was due to bromides.

Force thinks the experiment also proves that even inert vaccine material may produce some reaction of immunity.

(4) Jour. Infect. Dis., July, 1915.

(5) Jour. Amer. Med. Ass'n., April 29, 1916.

(*) An abstract of an article on "Laboratory Diagnosis of Smallpox" by Force and Beckwith appears in Practical Medicine Series, 1916, Vol. I, p. 143.

Smallpox and Vaccinia. Kenna⁶ quotes the following definition of smallpox from Ashburn:

"Smallpox is due to a dual and visible virus, one part of which causes vaccinia and the specific smallpox eruption, the other part being necessary for the production of the contagious, generalized, often mortal disease with a distinct pre-eruptive stage and initial rashes. Vaccinia, therefore, protects against the pox stage of smallpox rather than against the whole disease."

Vaccination Does not Cause Tetanus or Tuberculosis. Palmer⁷ says that vaccination so far from causing tetanus has actually a protecting influence against it.

Efforts to inoculate guinea-pigs and monkeys with tetanus by light scarification of the skin and the application to the scarified area of a culture of tetanus failed to inoculate.

It is estimated that 32 million people were vaccinated against smallpox in the last ten years. Of these forty-one developed tetanus. This is less than the natural incidence of the disease.

The shorter the incubation period of tetanus the more fatal the disease. Prof. Hewlett says that he has never known of a recovery where the symptoms of tetanus manifested themselves within a week after the injury. The average mortality of tetanus with an incubation period of ten days or less is 61.7 per cent. The average appearance of tetanus after vaccination is 20.7 days. Yet the mortality rate of tetanus following vaccination is 75.2 per cent. These facts prove the infection to be post-vaccinal. The date of probable infection is the eleventh or twelfth day after vaccination.

Warlomont has shown that tuberculosis can not be inoculated by a superficial scratch such as that of vaccination. A deep injection is required. This explains why no one has been inoculated with tuberculosis while doing an autopsy. In every case of tuberculous infection there is a local lesion at the point of infection. No one has ever seen a tuberculous node develop at the site

(6) Medical Officer, May 27, 1916.

(7) Jennerian, March, 1916, quoted by Health Officer, May 27, 1916.

of a vaccination scar. For these reasons Palmer concludes that vaccination can not convey tuberculosis.

Antivaccination Literature. Drury⁸ holds that the medical profession has made a mistake in failing to answer the statements of antivaccinationists. When these people charge that vaccination has done harm in a given case the authorities or the physicians should insist upon names and addresses. The facts should be investigated. In Drury's experience investigation will show the charges to be without foundation. Whenever an antivaccinationist makes a speech he should be answered. Whenever a pamphlet is issued it should be replied to.

CEREBROSPINAL MENINGITIS.

Control of Cerebrospinal Meningitis. Rolleston⁹ says that whenever cerebrospinal fever appears its spread should be controlled by disinfection, isolation and bacteriologic examination of the secretions of contacts. Speaking generally, it suffices that the two who sleep and the two who mess on either side of the patient and his two most intimate friends should be examined as possible carriers.

The nasopharyngeal secretions and the urine of all contacts should be destroyed, their noses and throats should be douched two or three times a day with some warm, mildly antiseptic solution. Their isolation can be in a tent or some nearby building. Hospitalization is not necessary.

INFANTILE PARALYSIS.

Epidemics of Infantile Paralysis. Sumner¹ tabulates the infantile paralysis epidemics in the United States, 1880 to 1910, as follows:

	Cases.	Outbreaks.	Average No. of Cases.
1880-84	23	2	11.5
1885-89	93	7	13.
1890-94	151	4	38.
1895-99	345	23	15.
1900-04	349	9	39.
1905-09	8054	25	322.

(8) Medical Officer, May 27, 1916.

(9) Brit. Med. Jour., Oct. 23, and Nov. 6, 1915.

(1) Iowa Special Circ., July 10, 1916.

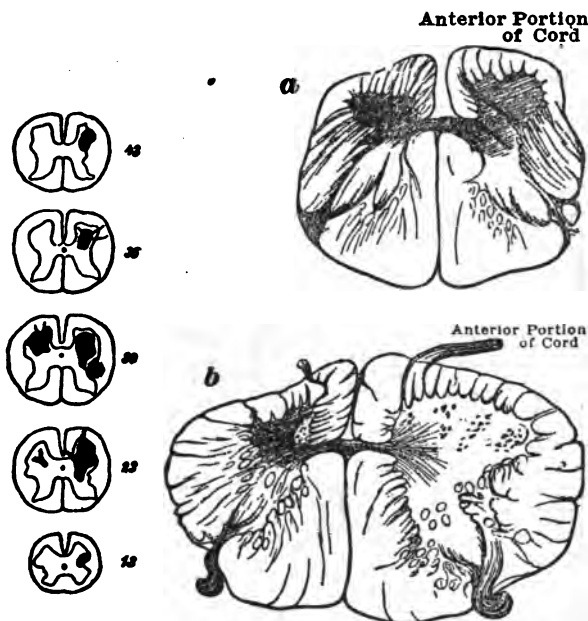


Fig. 9. Localization of the diseased area in the anterior horns of the lumbar enlargement of the cord in a child two years old, eleven months after the beginning of the disease. A larger area of softening in the right, a smaller one in the left anterior column; 13, 23, 30, 36 and 43 mm. above the termination of the cord. After Roth.

Spinal cord with acute spinal paralysis, forty-three years after the beginning of the disease. (a) Section through the lumbar (back) enlargement, both anterior horns and antero-lateral columns strongly shrivelled, more on the left side than on the right. No ganglion-cells are present. (b) Section through the cervical (neck) enlargement; the left anterior horn and antero-lateral column very strongly shrivelled. No ganglion-cells are present. The posterior columns and posterior horns in both sections are normal. A careful study of these figures will reveal much information regarding the lesions in the spinal cord as a result of acute Anterior Poliomyelitis or Infantile Paralysis. After Charcot and Joffroy.

In 1907 there was an epidemic in New York in which there were 2,500 cases. In 1909, Nebraska had 619 cases.

New York City 1916 Epidemic. Lavinder² reports that the epidemic in New York City reached its maximum during the week of August 12 when 1,210 cases were reported. Since that time there has been a gradual de-

(2) Pub. Health Rep., Vol. 31, No. 36, Sept. 8, 1916.

cline. The fatality rate of the cases is 23.5 per cent.; 9.8 per cent. of the children were under 1 year of age, 76.9 per cent. between 1 and 5; 9.8 per cent. between 6 and 10; 2 per cent. between 11 and 15; 1.5 over 15. As the epidemic has progressed the tendency of the disease to affect older people has increased somewhat. In

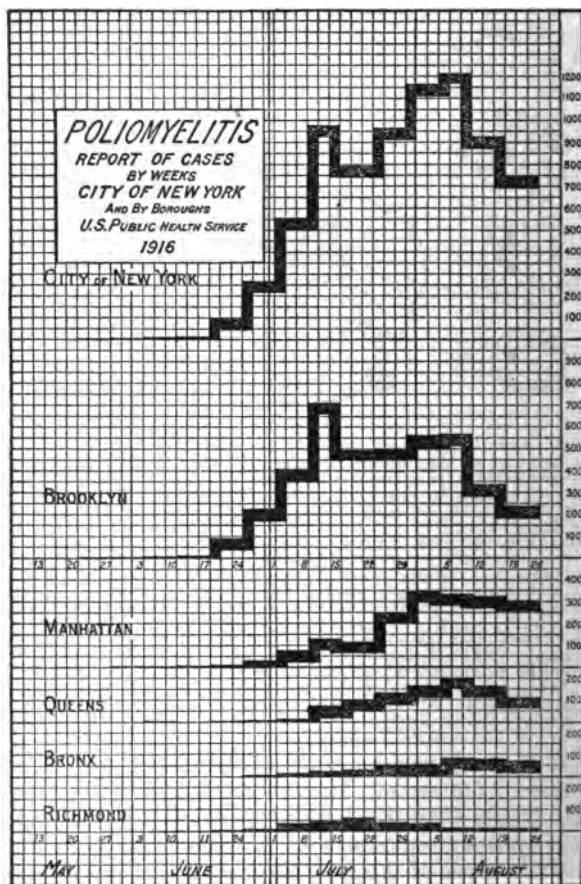


Fig. 10.

May and June it was 2.4 per cent.; in August, 3.7 per cent. The fatality rate among adults with poliomyelitis is higher than that among children (Fig. 10).

A study of 7,000 cases of familial poliomyelitis occurring in 6,748 families shows that they were distributed as follows: One case in family, 96.63 per cent.; two cases in family, 3.04 per cent.; three cases in family, 30 per cent.; four cases in family, 0.014 per cent.; five cases in family, 0.014 per cent.

The epidemic began in Brooklyn on May 9.³ Twenty cases occurred between that time and the end of May. However, but two of these cases were reported to the Health Department during May. On June 8 several cases were reported to the department. This group of cases attracted attention and an investigation which found the May cases and a considerable group of June cases was started. On June 17 the presence of an epidemic was announced in the daily press.

The epidemic started in an Italian quarter and the majority of the earlier cases were among Italians. The later cases have developed without regard to racial distribution.

Nature, Manner of Conveyance and Means of Prevention of Infantile Paralysis. Upon the outbreak of the New York epidemic, Flexner⁴ delivered an address at the New York Academy of Medicine before the medical profession of New York City. This address was published in the daily papers and later was reprinted by various state and municipal departments of health and given the widest publicity.

Flexner said that infantile paralysis is an infectious and communicable disease due to a minute filterable microörganism which has now been secured in artificial culture and as such is distinctly visible under the higher power microscope. This organism exists constantly in the central nervous organs and upon the mucous membranes of the nose and throat and of the intestines in persons suffering from the disease. Flexner says that it has not been detected in the general circulating blood of patients. It has been found in the blood of monkeys.

(3) Pub. Health Rep., Aug. 18, 1916.

(4) Rockefeller Inst. Med. Res., Spec. Bull., July 13, 1916.

Lovett⁵ holds that it is carried by the blood in human beings. The virus is also found on the mucous membranes of well persons who have been in contact with cases of the disease. The virus escapes from the body with the secretions of the nose and throat and with the excretions from the bowels.

Flexner holds that the disease is not spread by the bites of stable flies. He says that observations in human cases of infantile paralysis all indicate that the main avenue of entrance of the virus into the body is by way of the upper respiratory mucous membranes. The virus is thrown off in the mouth and nose secretions and is distributed by coughing, sneezing, kissing and by means of fingers and articles contaminated with these secretions as well as with the intestinal discharges. It withstands the highest summer temperatures, complete drying and the action of such weak chemicals as glycerine and carbolic acid. The dried secretions may be spread in dust. Strong sunlight kills the virus.

The virus will remain alive on the body of a fly for forty-eight hours or longer. The existence of cases of paralysis in domestic animals during an epidemic of infantile paralysis is coincidental and not the result of cause and effect. In an epidemic the disease spreads along ordinary routes of travel.

The virus does not persist in the interior of the human body. It has been detected in the nose and throat secretions five months after the acute onset of the disease. In the nose and throat of a monkey it has been known to persist for six months.

The virulence of the virus varies in different epidemics and even at different stages of the same epidemic. The susceptibility of persons also varies from time to time. The incubation period is from two to fourteen days; the average is eight days. The period of infectivity rarely exceeds from four to five weeks.

An attack confers immunity. This is true of the abortive form as well as of the severer varieties. The blood of persons who have recovered from the disease is capable of destroying or neutralizing the effect of the virus. This immunizing substance appears in the blood

as early as the fifth day of the disease. It persists there for more than twenty years.

The production of an active protecting immunity has not proved practicable. The serum treatment consists in injection into the spinal canal of blood serum from a person who has recovered from the disease. The date of recovery is immaterial as is the type of the disease in the recovered person. Netter reports the successful use of serum in 35 cases. Flexner thinks that hexamethylenamine may be of some service.

The Adrenalin Treatment. Meltzer⁶ advocates the injection of 2 c.c. of a 1 to 1000 solution of adrenalin into the spinal canal every four to six hours. Before the first injection several cubic centimeters of spinal fluid should be withdrawn. The adrenalin is washed in with 2 c.c. of normal salt solution. The primary basis of this recommendation was an observation that death often ensued in infantile paralysis from a pressure paralysis of certain respiratory centers and not from degeneration lesions in the cord cells. Later he came to think that in addition there was a possibility that adrenalin was a specific since the adrenals as well as the sympathetic ganglia may be specifically antagonistic to the virus of poliomyelitis.

Regulations for Hospitals Taking Infantile Paralysis. The New York City 1916 epidemic of infantile paralysis is the most extensive in the history of the world. On September 9, the New York City Department of Health⁷ reported that there had been 8,389 cases and 2,074 deaths from infantile paralysis in that city in 1916 up to September 7.

The course of the epidemic is shown by Figure 11.

The same issue of the bulletin contains the following regulations for hospitals caring for patients ill with poliomyelitis.

1. The exterior windows of every such hospital shall be at least twenty feet away from adjoining residential property.

Wards to be devoted to the use of patients suffering with poliomyelitis must be provided with proper screens for all doors, win-

(6) New York Med. Jour., Aug. 19, 1916.

(7) Weekly Bull., Dept. of Health, City of New York, Sept. 9, 1916.

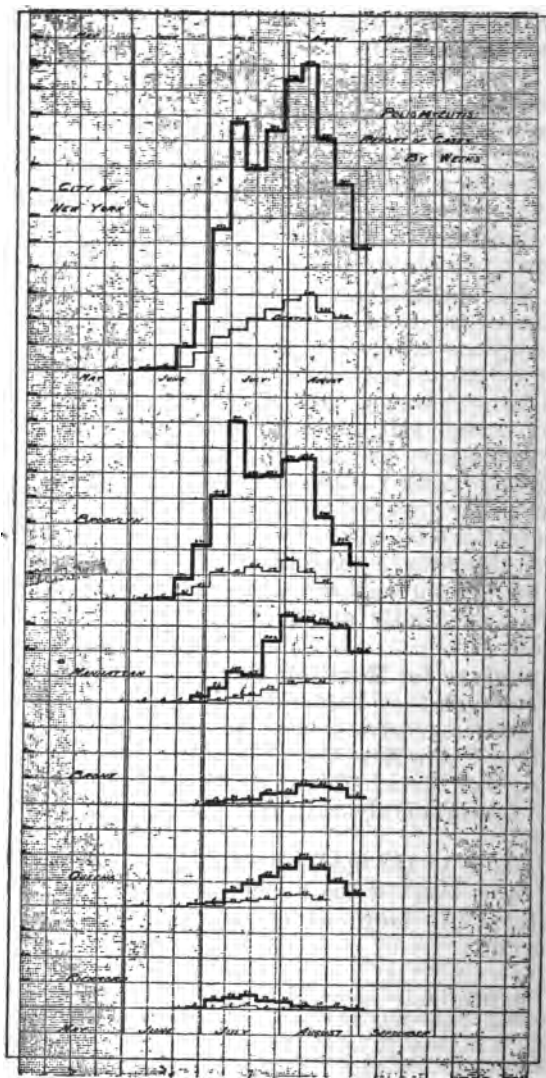


Fig. 11.

dows and transoms; they must have suitable and separate bath and toilet accommodations.

2. Suitable gowns and hoods must be provided and worn by all employes and visitors.

All clothing, bed linen and dishes used in these wards must be sterilized before removal.

Employes on duty in these wards must have no other assignment.

3. Daily telephone report must be made to the Department of Health of all admissions, discharges and deaths.

4. Cases proving not to be poliomyelitis must not be discharged until the diagnosis is confirmed by an inspector of the Department of Health.

5. The period of quarantine for poliomyelitis is eight weeks from the date of onset of the disease and all patients must be held in quarantine and not discharged until such discharge is authorized by an inspector of the Health Department.

6. Circulars of information regarding after-care for children recovered from poliomyelitis are to be given to the parent or guardian at the time the patient is discharged from the hospital.

7. Notice (using printed form furnished by the Health Department) of discharge of all cases of poliomyelitis must be forwarded on the day of discharge to Director, Committee on After-Care of Poliomyelitis.

8. The printed forms of the Health Department for keeping physical and clinical records of patients should, if possible, be used in all cases.

9. Each patient may be visited twice during the stay in the hospital, by a parent or guardian. If the child is critically ill, the parent or guardian must be notified and permitted to visit daily while child is dangerously ill. Information relative to the patient's condition should be given out at the Information Desk in each hospital, or by telephone in response to telephone inquiry from the parent or guardian.

10. In fatal cases of poliomyelitis, the parents must be allowed to view the body, if desired. The coffin must subsequently be sealed with the Health Department seal but burial within 24 hours is not required. The funeral must be private.

Methods for the Control of Infantile Paralysis. A committee appointed at a conference of State and Territorial boards of health with the Public Health Service reported the following suggestions for the guidance of state boards of health in controlling epidemics of infantile paralysis:⁸

I. It is the sense of this committee that the first step proper to be taken by a State health authority, believing its territory to be in danger of an invasion by poliomyelitis from another State

or part of a State, is to call the attention of the United States Public Health Service to the situation believed to be dangerous, and to request the United States Public Health Service to take whatever steps are necessary to prevent the interstate spread of poliomyelitis.

II. The necessary steps ordinarily to be taken by the United States Public Health Service in such a contingency are believed to be:

(1) Investigation of the infected area.
(2) Notification concerning the removal of persons 16 years of age or under from an infected area to a named point of destination in another State, said notification to be addressed in every case to the State health authority of the State of destination.

(3) The forms of notification and of health certification and of permits to travel should include the following information and specifications with such additional information and specifications as the United States Public Health Service deems necessary:

Identification of each traveler, the exact location of present or usual residence, and record of premises as to freedom from poliomyelitis during the preceding three months; or as to latest date of infection if less than three months; or as to renovation or cleansing of premises after infection.

(4) Permits to travel shall be void unless the journey shall begin within 24 hours after issue of the permit.

(5) Single permits shall not be issued for several persons, except for family or household groups coming from the same domicile.

(6) The collection of fees, by health officials, from applicants for permits, whether resident or non-resident, should not be permitted.

(7) The certificates of private physicians will not alone be a sufficient basis for the issue of a permit to travel. Permits for interstate travel will be based on medical inspection.

(8) Permits for interstate travel should be signed by an officer of the United States Public Health Service, or by the State health officer, or by an officer authorized by the State health authority.

III. The committee disapproves quarantine by one State against another State or quarantine by one community against another community in the same State. It is believed that the Federal Government, through the United States Public Health Service, can perform all the duties of notification and certification required in interstate relations in case of unusual prevalence of poliomyelitis, and that State health authorities can and should perform like services as between communities in the same State during unusual prevalence of poliomyelitis.

IV. It is recommended that all cases of poliomyelitis should be reported immediately to the local health authorities and to the State health authorities, and that State health authorities make weekly reports to the United States Public Health Service of all cases of poliomyelitis. The United States Public Health Service is asked to furnish general reports weekly.

V. It is recommended that all persons 16 years old or under, with a clean bill of health, and removing from an infected area

or district to another locality, should be kept under medical observation daily for two weeks from the date of the certificate.

VI. It is believed that the period of isolation of a case of poliomyelitis should be not less than six weeks from the date of onset.

VII. The isolation of cases of poliomyelitis should be stringent isolation of the sick person with attendant or attendants, in a properly screened room or rooms, with disinfection at the bedside of all bodily excretions. Wherever it is possible, the removal of patients to a hospital is greatly to be preferred to isolation in a private house or apartment.

VIII. In case of death from poliomyelitis the funeral should be strictly private.

IX. Wherever poliomyelitis is unusually prevalent, assemblages of children in public places should be prohibited.

X. During unusual prevalence of poliomyelitis, schools should not be opened without thorough medical supervision by a health authority. When schools are opened, beginning should be made with high schools, and proceeding to lower age groups no more rapidly than complete medical examinations can be made.

XI. Because of the existence of unknown carriers of the infectious virus of poliomyelitis, and because the infectious virus is present in the body discharges of such persons, therefore all measures to prevent contamination by human excreta or other bodily discharges, the suppression of the fly nuisance, prohibition of the common drinking cup, and a general educational campaign for cleanliness and sanitation, with particular instruction of parents and children concerning personal hygiene, especially of the mouth and nose, are strongly urged by the committee.

XII. To aid in preventing the spread of poliomyelitis, common carriers should instruct their agents and ticket sellers by direct order, as well as by public notices, when poliomyelitis is unusually prevalent, that travelers with children of 16 years or under must be provided with a health certificate, as detailed in another section of this report. Common carriers are to be notified of the area and prevalence of the infection and at what points certificates must be displayed before permitting the travel of children of 16 years of age or under.

XIII. The epidemic prevalence of poliomyelitis in certain States at this time indicates a probability of epidemic prevalence next year in States not gravely affected at the present time. It is believed that the measures here recommended should be continued in operation at least until such time as the incidence of the disease has subsided to or below its usual level.

Methods for Controlling Infantile Paralysis. The conference of State and Territorial Boards of Health with the Public Health Service⁹ also adopted the following recommendations to local health officers engaged in controlling an epidemic of infantile paralysis:

(9) Pub. Health Rep., Sept. 8, 1916; Vol. 31, No. 36.

1. *Reports.*—Every physician, attendant, parent, householder, or other person having knowledge of a known or suspected case of acute anterior poliomyelitis (infantile paralysis) must immediately report the same to the local health authorities.

2. *Placarding.*—Whenever a case of acute anterior poliomyelitis is reported to the local health authorities, they shall affix in a conspicuous place at each outside entrance of the building, house, or flat, as the case may be, a warning card. Defacement of such placards or their removal by any other than the local health authorities or the duly authorized representative of the State board of health is strictly prohibited.

3. *Quarantine of patient.*—All cases of acute poliomyelitis must be quarantined for at least six weeks. Quarantine must not be raised, however, until the premises have been thoroughly disinfected by or under the supervision of the health officer. All persons continuing to reside on the infected premises shall be confined to the infected premises until quarantine has been raised, except as hereinafter provided.

No one but the necessary attendant, the physician, the health officer and representatives of the State board of health may be permitted to enter or leave the infected premises. Upon leaving they must take all precautions necessary to prevent the spread of the disease. The nursing attendant may leave the premises only on permission granted by the local health officer.

4. *Quarantine of exposures.*—Members of the family over 16 years of age may be removed from the infected premises upon permission granted by the local health officer after thorough disinfection of person and clothing.

Children of the family may be removed from the infected premises upon permission of the local health officer after thorough disinfection of person and clothing. Such children may be removed only to premises upon which none but adults reside, and must be confined to the premises (in the house) for two weeks from date of removal, during which period they must be kept under close observation by the local health authorities, and no child shall be permitted to visit or otherwise come in contact with them during this period. They must not return to the infected premises or come in contact in any way with the patient or attendant until quarantine has been terminated.

All children who continue to reside on the infected premises must be held under close observation for at least two weeks following termination of the last case on the premises.

5. *Exclusion from the schools, etc.*—All children who continue to reside on the infected premises must be excluded from the schools and other public gatherings for at least two weeks following date of raising of quarantine.

All children who have been exposed to the disease and who have been removed from the infected premises, in accordance with the provisions of Rule 4, must be excluded from the schools and from all public gatherings for at least two weeks from date of last exposure.

The patient must be excluded from the schools and all public gatherings for at least two weeks after quarantine is raised.

School-teachers and other persons employed in or about a school building who have been exposed to the disease must be excluded from the school building and grounds for a period of two weeks following date of last exposure and until persons and clothing have been thoroughly disinfected.

Whenever the schools are closed on account of an outbreak of acute poliomyelitis, children under 16 years of age shall be excluded from Sunday schools, churches, picture shows, and all other public gatherings and shall be confined to their own premises.

6. *Precautions.*—No person, except the necessary attendant, the physician, and the health officer may be permitted to come into contact with the patient. Such persons must not handle or prepare food for others, and their intercourse with other members of their household must be as restricted as possible.

The infected premises, especially the sick room, shall be thoroughly screened against flies, and any such insects as may enter the sick room shall be exterminated therein. All toilets used by the patient or attendants and those in which discharges from the patient are deposited must be thoroughly screened against flies and freely treated with an approved disinfectant.

7. *Removals.*—No person affected with acute anterior poliomyelitis shall be removed from the premises upon which he is found unless consent to such removal be first obtained from the local health authorities or the State board of health, and then only after strict compliance with the provisions of these rules. Under no circumstances shall permission be granted for the removal of any patient or article from the infected premises to any premises upon which milk or other food stuffs are produced, sold, or handled.

No person affected with acute anterior poliomyelitis shall be removed from any city, village, township, or county in which he is found unless consent to such removal be first obtained from the State board of health.

8. *Sale of milk and other foodstuffs from infected premises prohibited.*—Whenever a case of acute anterior poliomyelitis shall occur on any premises where milk or other foodstuffs are either produced, handled, or sold, the sale, exchange, or distribution on such premises in any manner whatsoever, or the removal from the infected premises of milk, cream, any milk products or other foodstuffs until the case has been terminated by removal, recovery, or death, and the premises and contents and all utensils have been thoroughly disinfected under the supervision of the local health authorities, is prohibited: *Provided*, That in the event of acute anterior poliomyelitis occurring on a dairy farm the live stock, the properly sterilized milk utensils and delivery outfit, may be removed to some non-infected premises and the milking done and milk cared for and sold from such other premises by persons other than those of the household of the person so affected, upon obtaining permission to do so from the local health authorities or the State board of health.

Whenever a case of acute anterior poliomyelitis shall occur on premises connected with any store, such store shall be quarantined

until the case has been terminated by removal, recovery, or death, and the premises are thoroughly disinfected: *Provided, however*, That if the premises are so constructed that the part in which the case exists can be and is effectively sealed, under the supervision of the local health authorities, from the store: *And provided further*, That the employees and all other persons connected with the store do not enter the part of the premises where the case exists and do not come in contact with the patient, his attendant, or any article whatsoever from the quarantined premises, the store attached to the quarantined premises need not be closed.

9. *Delivering of milk, groceries, and other necessities.*—Milk, food stuffs, and other necessities may be delivered at the quarantined premises, but there must be no contact between the patient or attendant and the delivery agent. The householder must provide a sterilized container (a freshly scalded bottle or pail) to receive the milk, and the delivery agent must not handle this bottle or pail in making the delivery.

No milk bottle, basket or any other article whatsoever may be taken out of or away from the infected premises during the period of quarantine. Before milk bottles are removed from the premises after quarantine is raised they must be sterilized under the direction of the local health authorities. Mail which has been handled by the patient or attendant must not be taken from the premises.

10. *Disinfection.*—All articles taken from the sick room must be disinfected upon removal. Exposure in the open air of carpets, rugs, curtains, bedding, and similar articles from the infected premises for the purpose of airing, shaking, beating, or sunning is strictly prohibited, unless, in the opinion of the local health authorities, such may be done without danger of the spread of the disease.

Books, toys, and other similar articles used to amuse the patients are best disposed of by burning. Under no circumstances should borrowed toys or books be returned. Library and school books must not be returned; they must be burned.

Bed and body linen which has been in contact with the patient and handkerchiefs or cloths which have been used to receive discharges from the patient must be immersed in an approved disinfectant before removal from the sick room, and after removal should be boiled.

All discharges from the patient must be thoroughly disinfected before removal from the sick room.

No article of clothing or other article may be removed from the infected premises to a laundry or other place for washing unless previously disinfected by immersion in an approved disinfectant and the approval of the local health authorities has been obtained.

House animals, such as cats, dogs, or any other household pets, and all other animals or fowls must be strictly excluded from the infected building, house, or flat, as the case may be, during the entire period of quarantine. Any such animals which have been in contact with the patient must be subjected to a thorough disin-

fecting bath before removal from the infected building, house, or flat, and must not be permitted to re-enter the same. Such animals must be confined in an out-building. Dogs and cats running at large should be destroyed.

Before quarantine is raised the infected premises and all articles of furniture and clothing therein must be thoroughly disinfected by or under the supervision of the local health authorities in a manner approved by the State board of health.

11. *Deaths, burials, and transportation of the dead.*—When the body of anyone dead from acute anterior poliomyelitis is to be transported by railroad or other common carrier, the official rules of the State board of health governing the transportation of the dead must be observed.

BUBONIC PLAGUE.

Spread of Plague. Creel¹ summarizes the result of his experience with bubonic plague in New Orleans and the experience of others in, that city, San Juan, Havana and elsewhere.

1. Diffusion of plague infection within a city limits is chiefly, if not entirely, from migration of infected rodents.

2. The transmission of plague by flea-infested clothing from a human case is a remote contingency.

3. The possibility of transmission of infection by loose fleas in merchandise is evident. It is improbable, however, as the natural tendency of a flea is to get back to its natural habitat, man and the clothes on his body and certain animals.

4. The travel of infection from one community to another is generally accomplished by infected rodents transported in merchandise.

RAT BITE FEVER.

Blake² says that rat bite fever is a specific infectious disease occurring in Asia, Europe and America, and due to the bite of a rat. The specific organism is *Streptothrix murisratti* of Schottmüller. The organism invades the blood-stream and may cause ulcerative endocarditis.

(1) Amer. Jour. Pub. Health, March, 1916.

(2) Jour. Exp. Med., January, 1916.

VENEREAL DISEASES.

Control of Venereal Diseases. The British Royal Commission on Venereal Diseases¹ grew out of certain resolutions passed by the International Medical Congress meeting in London in 1913. The Commission was appointed in 1913. In 1914 it published a preliminary blue book giving the evidence taken.

One of the conclusions of this final report is that 10 per cent. of the population of large British cities have had syphilis and that about three times as many have had gonorrheal infections.

The Commission made 35 recommendations. The following are among those of especial importance to the profession in the United States.

The death certificate should give the relation of venereal disease to the death when there is such relation. Such information should be made confidential by law.

In reporting still-births a notification in which the duration of pregnancy is given as less than twenty-eight weeks should cause an investigation as to the presence of venereal disease.

All hospital, homes, asylum and dispensary records should show the amount of venereal disease among those receiving service.

Statistics should be kept of the number of people receiving salvarsan or other drugs for venereal disease at public expense.

All institutions supported by the government or receiving grants from governments should keep records of the amount of venereal disease among their patients.

Laboratories for the diagnosis of venereal diseases should be established.

The fullest use should be made of university and hospital laboratories.

The best modern treatment of venereal diseases must be made available and convenient.

Hospital cases should be cared for in general rather than in special hospitals.

Evening clinics at hours convenient to working people should be provided.

(1) Final Report, March, 1916.

All physicians, private and public, treating cases of venereal disease should give each such patient a card of instruction and warning.

Medical students and practitioners must be given the fullest opportunities to learn venereal diseases clinically.

Every prison should be equipped with facilities for treating venereal disease and every prisoner must be treated until cured.

Soldiers and sailors afflicted with venereal disease should not be discharged at the end of their enlistment until they are well.

No system of notification of venereal disease should be put in force at present.

Advertisements of remedies for venereal disease should be prohibited.

The presence of infectious venereal disease should constitute an incapacity for marriage.

In elementary schools, detailed instruction in class of sexual matters should not be undertaken. Teachers should teach pupils about sexual matters by private interviews. Courses of instruction in sexual matters should be provided in continuation schools, factories and work-shops.

More careful instruction should be provided in regard to moral conduct as bearing on sexual relations throughout all types and grades of education. Such instruction should be based on moral principles and spiritual considerations and should not be based only on physical consequences of immoral conduct.

Campaign Against Venereal Diseases. Davis² opens a discussion of a campaign against venereal diseases by quoting Prof. Irving Fisher as follows:

"In 1900 sleeping out of doors branded the sleeper as a crank. Today architects and builders find sleeping porches profitable and almost necessary adjuncts of new houses, so general is the demand for them. Public opinion on the subject of fresh air and especially of night air has been revolutionized. I might say that on this matter of fresh air we have turned upside down within little more than a decade. Yet we are not now standing

on our heads. And why? Because we used to be wrong side up."

On this question of venereal diseases we have been wrong side up. The time has come to stand right side up. Venereal diseases are forms of contagion and are therefore matters for public health administration. Furthermore, they are of prime importance. To cure and prevent syphilis and gonorrhea as prevalent contagious diseases; to provide the necessary facilities to accomplish this purpose for the whole community; that is the point of view from which we should approach this matter.

The recommendations made by Davis are as follows: There should be an increase of the number of hospital beds for syphilis and gonorrhea. Dispensary clinics must be standardized as to equipment and procedure. They must be periodically supervised and criticised. This supervision and criticism must be done by the health department. There must be evening clinics. Private organizations must be encouraged to start pay clinics on a self-supporting basis. The provision of laboratory tests, of salvarsan and possibly of other medicines, or materials, are proper forms in which public funds can assist such private clinics as conform to satisfactory standards.

Goler³ thinks that a campaign against venereal disease must proceed along two lines. There must be education not only as to venereal diseases but as to sex hygiene. The education in sex hygiene must be done largely by the parent. The mother must be the teacher. There must also be administrative measures for the more direct control of venereal disease. These measures must include better facilities for the cure of those infected, more knowledge of those who are infected and punitive measures against those who are determined in their efforts to spread infection.

Control of Venereal Diseases. Snow⁴ is of the opinion that control of venereal diseases is in a fair way to be generally adopted as one of the activities of health departments.

The following are cited as established activities:

(3) Amer. Jour. Pub. Health, April, 1916.

(4) Jour. Amer. Med. Ass'n., April 1, 1916.

1. Public Health Laboratory equipment for free examinations for evidence of syphilis and gonococcus infections: In 1914 New York City Health Department examined 59,614 specimens for venereal infection; 75 per cent. of which were from private physicians. The Massachusetts state department is making about 1,000 Wassermann examinations a month.

2. Provision for Clinical Diagnosis and Advice: The New York City Health Department gave advice to 3,000 in a single year. The Oregon State Board of Health has given advice to 5,000 within the past four years. Other health departments are following in the footsteps of these. The giving of advice is distinguished from the giving of treatment in these venereal disease advice clinics.

3. Dispensaries for Venereal Disease: Venereal disease clinics are not on a very satisfactory basis. The New York State Health Department investigated twenty-seven syphilis clinics and found it possible to approve only seven. They investigated twenty-six gonorrhea clinics and found it possible to approve only four.

Of the patients with gonorrhea treated in the Lakeside clinic of Cleveland only 11 per cent. were discharged as cured; at the Boston Dispensary 11.4 per cent.; of two New York clinics 9.7 and 9.4 per cent.

While a great many dispensaries treat venereal diseases, so many that the dispensary provisions for venereal diseases might seem to be adequate, owing to the inefficiency of such dispensaries in their equipment and methods the provision is far from adequate.

4. Venereal Disease Hospitals: Snow's investigations showed a great need for standardizing the treatment of venereal disease in hospitals.

5. Reporting of Venereal Diseases: This was made compulsory in California in 1910. New York City has an ordinance requiring reporting. The new Vermont venereal disease law is very comprehensive.

Among other prophylactic measures in use are instructions of persons exposed, promotion of continence, and dissemination of general information as to syphilis and gonorrhea. Snow does not approve of the use of the prophylactic package, especially in civil life.

Among other measures for the control of venereal disease recommended by Snow are:

1. The repression of prostitution through law enforcement.

2. The provisions of ample facilities for wholesome play and recreation and reduction of environmental and social conditions which encourage extra-marital sex relations.

3. The elimination of alcoholic drinks.

4. Promotion of sex education and general standards of personal conduct which are in keeping with high moral principles.

5. The encouragements of early marriage after maturity has been attained and promotion of economic and social conditions conducive thereto.

Of still greater importance are the efforts of certain health departments to discover venereal disease in certain employes by periodic physical examinations. Among such workers are cooks, waiters, peddlers, soldiers and sailors.

[Dr. Snow is chairman of a committee on venereal diseases of the American Public Health Association and these above items are among the recommendations of that committee.—Ed.]

Venereal Disease Dispensaries. The unsatisfactory standing of the treatment of gonorrhea is shown by a report on the efficiency of venereal disease clinics by Dr. P. S. Platt.⁴ For this condition the chief cause is the wrong opinions and the lack of stamina and balance of those who have gonorrhea. An important factor, however, is the inefficiency both of the treatment of gonorrhea and of the follow-up methods of the dispensaries.

When the New York City Department of Health launched its campaign against venereal diseases it decided not to install its own venereal disease clinics unless it was proved that such clinics maintained by outside agencies were hopelessly ineffective.

In a survey of twenty-seven venereal disease clinics it was found that only one kept statistics of cures. Four of the best venereal disease clinics in the city agreed to make a statistical study of the results of treatment of

(4) Amer. Jour. Pub. Health, September, 1916.

gonorrhea. They reported on 854 cases. Of these 8 per cent. of the patients were discharged as cured; 17 per cent. ceased treatment of their own accord and were improved though not cured—a cure was entered when a patient gave no symptoms and did not give a complement-fixation reaction; 75 per cent. ceased treatment uncured; 28 per cent. of the patients only came to the dispensary once; 11 per cent., twice; 7 per cent., three times; 6 per cent., four times—or 52 per cent. made less than five visits.

The average man among those cured made between sixteen and twenty visits; among those ceasing treatment improved, from ten to fifteen visits; among those ceasing treatment unimproved, two visits. The 75 per cent. who quit unimproved made over 50 per cent. of the visits. Of the 67 discharged as cured 78 per cent. made over eleven visits. Of the 146 ceasing treatment as improved 61 per cent. made over eleven visits. Of the 641 ceasing treatment unimproved 16 per cent. made over eleven visits.

The basis of a diagnosis of "improved" was, cessation of discharge, improvement in urine and absence of gonococci in smears.

Platt thinks that the same lack of records of ultimate results of treatment and the same lack of a follow-up system applies to all the 122 public and private dispensaries treating all varieties of disease. These dispensaries use some of the time of 5,000 physicians.

In the Boston dispensary the introduction of a simple postcard follow-up system brought back 50 per cent. of the patients who had dropped out. It brought back 62 per cent. of the genito-urinary cases.

Platt recommends that the cards in a dispensary be filed under a cross index, one for names and addresses and the other for diagnosis, and that a follow-up system be used.

Segregated Districts and Venereal Diseases. Warner⁵ is of the opinion that closing the segregated district has lessened the number of infections with syphilis in Cleveland. An investigation of the records of the Lakeside dispensary for the eight months just prior to the closing of the district was made. In that eight months

(5) Cleveland Med. Jour., 1916, p. 171.

the dispensary got full records of 112 cases of syphilis applying for treatment. The sources of infection were as follows:

	Per cent.
Segregated district	40.2
Street walkers	25.9
Clandestine prostitution	8.9
Accidental	12.4
"Friends"	9.8
Marital	2.6

During the eight months following the abolition of the district only fifty-three patients with syphilis applied for treatment. The sources of infection were:

	Per cent.
Street walkers	33.3
"Friend"	22.2
Accidental	33.3
Clandestine prostitution	11.1

Warner thinks the reduction of the number of syphilis recorded at this dispensary from 112 to 53 is proof that the closing of the segregated district has decreased syphilis.

OCCUPATIONAL DISEASES.

Health Insurance. As secretary of the American Association for Labor Legislation, Andrews¹ proposes certain fundamentals for sickness insurance laws which he quotes Schroedtmann, chairman of the committee for Accident Prevention and Workmen's Compensation of the National Association of Manufacturers as saying will be enacted within the next five years. He also quotes the *Union Labor Bulletin* as saying that labor representatives and organizations will lend every aid to such a campaign.

Under the proposed law, funds are to be raised by compulsory payments of equal amounts by the employer and the employee to which the state is to add one-quarter as much as the sum of the other two payments. The pay-

(1) *Med. Record*, Feb. 26, 1916.

ments are to be graded according to the pay of the workers, and also according to the experience, sickness and death-rates of the different trades and occupations.

The workman receives medical care and medicine, cash benefits for a maximum of twenty-six weeks disability and funeral benefits.

The insurance is to be conducted by self-governing local or trade organizations. While the law embodies some of the features of the German law it conforms more closely to the Lloyd George British act of 1911.

Andrews holds that such insurance offers the best solution of some of the great disease problems and especially of the tuberculosis problem. It has so proven in Germany and in lesser measure in Great Britain.

"After three years' experience with compulsory health insurance the British physicians confess that only since the passage of the act have they been able to treat anemia among the working classes."

The British government decided to supplement the funds under the Insurance Act so as to make it possible to care for the tuberculous among the uninsured as well as among the insured. In 1910, the number of cases of tuberculosis cared for in sanatoria by the Insurance Fund was 47,000. From 1897 to 1910 the number given sanitarium care was 322,000; 67 per cent. of all the funds was spent for the care of consumptives. In 1909, 83 per cent. of the persons treated for consumption through funds provided by this Act were so far cured that no danger was felt of their becoming unable to earn a living.

The tuberculosis death-rate in Germany has dropped from 344 per 100,000 in 1880 to 136.5 in 1913. Much of the reserve funds under the German Act are used to build homes for workingmen.

The increasing demand for health insurance in the United States is coming from a great many sources. The literature during the year contains many reports of committees of sociologists, health authorities and physicians advocating health insurance.

Woodward and Warren² in a committee report adopted by the state and territorial health authorities say that the

(2) Reprint No. 352, Pub. Health Rep., July 21, 1916.

following fundamental provisions should be embodied in any health insurance measure:

1. *Insured persons:* Every person engaged in a gainful occupation and earning less than a specified annual income, say \$1,000, should be entitled to the benefits provided under the law. Every person earning more than the specified annual income should be allowed to qualify for the same benefits or greater benefits according to annual income.

2. *Funds:* To be provided jointly by contribution from employees and employers; the Government to appropriate for the expenses of supervision and administration.

3. *Benefits:* The following benefits should be provided:

(a) *Cash Benefits:* Weekly cash payments in case of disability due to sickness, non-industrial accident, or to childbearing by the beneficiary, for a period not to exceed twenty-six weeks in any one twelve-month period.

(b) *Death Benefits:* Cash payment (for funeral expenses) to legal heirs for death due to sickness or non-industrial accident.

(c) *Medical Benefits:* To include adequate medical and surgical care, medicines and appliances in home, hospital, sanatorium, dispensary, or physician's office, beginning with the first day of disability, whether due to sickness, non-industrial accident, or to childbearing by the beneficiary or the wife of the beneficiary, and limited to a period of twenty-six weeks in one twelve-month period.

4. *Administration:* All matters of promulgation of rules and regulations and appeals should be vested in a national or state commission created for this purpose. All matters of local administration should be vested in local boards of directors, federated according to districts, subject to supervision by the central authorities, and rules and regulations promulgated by the commission.

The commission and all local and federated boards should be composed of persons representing the contributors to the funds. The number representing employees and employers should be in the same ratio as their respective contributions.

Provision should be made for free choice of any physi-

cian registered on the local panel, and provision might be made also for adequate institutional care for those who prefer this method of medical benefits.

A corps of full-time medical officers should be provided within the national or state health service to have supervision of all hospital or dispensary relief; to examine all insured persons claiming to be disabled, and to issue certificates in accordance with the regulations promulgated by the commission; to advise the administrative authorities and all contributors to the funds as to the best measures for the relief and prevention of sickness; to advise with the physicians attending sick members as to measures which will shorten the periods of disability; and to perform such other duties as may be fixed by regulations.

[A health insurance law in the United States will be the best possible stimulus to preventive medicine. Such laws in other countries have had this effect. In the first place the more recent laws provide for an increase of the taxes of a locality where the sickness rate is high. They also provide for increase in the taxes of an industry whose workmen are incapacitated by sickness or accident to an unusual degree. But even more potent for good are those provisions which induce men to have medical care in the earlier stages of their diseases.—ED.]

Classification of Hazards of Occupation. Hayhurst² has gathered in the office of the Ohio Board of Health reports on the health and accident hazards in 1,040 establishments and their 236,000 employees. These establishments were divided into six groups:

Those having known association with: (1) the use of poisons; (2) dust; (3) fatigue, monotony or inactivity; (4) heat, cold, moisture, or dampness; (5) the risk of contracting communicable disease; (6) miscellaneous hazards such as abnormal atmospheric pressures.

Study of this data convinced Hayhurst of the unreliability of present methods of classifying industrial hazards. In the first place the records of sickness, absences, work, employment and unemployment are poorly kept. In the second place, no conclusions are dependable unless they take into account time lost by men

(2) Amer. Jour. Pub. Health, May, 1916.

"who don't feel like working today," "want to rest awhile" or who give other reasons than illness for not working. Such men are often suffering from some mild form of trade intoxication or trade result. The inquiry should include in addition to the short reports of illness home investigation and inquiries made in the places where the men loaf.

The third shortcoming is the fact that not all the men working in a certain industry are doing work peculiar to that industry. Such work is generally limited to the processors.

Hayhurst suggests the following as a basis for classification of the hazards of occupation:

1. The hazards of a general character, such as pertain to the general work of the average workers in that climate and under the general environment.

2. The hazards of the immediate work space environment. The peculiarities of the environment may be classified as chemical, physical or physiologic depending upon the factor which is principally responsible for the hazard. The hazard in this group concerns all the workers in such work, space, environment, except the processors.

3. The hazards to which the processors are subjected. The processors are usually the skilled laborers. For instance, in a given factory there may be many processors. The men at work in one process are subject to more hazards than those engaged in other processes. In the room with the process men are helpers, carriers and others who are subject to the hazards of the second group but not to those of the third. Also working around the factory are other men who are subject only to hazards of the first group. The accompanying table shows Hayhurst's classification of hazards to which a 16-year-old girl working as a cigar roller is subject:

ANALYSIS OF OCCUPATIONS IN RELATION TO HEALTH HAZARDS.

(*) signifies slight hazard; * signifies fair hazard; ** signifies considerable hazard.

*Classification**Basis:*

"Index to Occupations," U. S. Census, Feb. 1915.

The Physiologic Type of Worker

Youth **

Female *

Male

The Physiologic Type of Work

The "Occupation"

The Health Hazards

Basis: Results of inspections and investigations.

"Industry" as named

"Occupations" (as named)

General Worker

Helper Class **Processor Class

Diversified

Diversified but limited to a space

**Constant application
(Skilled, semi-skilled)

Industry

Department (work space)

Process

(1) Geographic—
Rural, village or city*
Latitude
Altitude
Water
Soil

(1) Chemical—
Poisons
**Infections
*Odors

(1) Chemical—
(*) Poisons
Infections
*Odors

(2) Climatic—
Seasonal influences
(*) Temperatures
Humidities
Sun
Wind

(2) Physical—
**Air movement
*Temperatures
*Humidities
(*) Illuminations
(*) Air contaminants
Air pressures
*Sanitary inadequacies

(2) Physical—
(Air movement)
Temperatures
Humidities
Illuminations
*Air contaminants
(Air pressures)
(Sanitary inadequacies)

(3) Biologic—
Plant relations
Animal relations
*Human relations

(3) Physiological—
.....
*Irritants
Stimulant incentives
(*) Dissipation incentives

(3) Physiological—
**Fatigue (over-use)
**Inactivity
(*) Irritants
*Stimulant incentives
(*) Dissipation incentives

Filled out for hazards for a 16-year-old girl employed as a "cigar roller" in a Cincinnati factory. Note how many hazards belong to the *work space* rather than to the *trade process*—a class of hazards often overlooked.

[The Glover Life Tables referred to by Hayhurst were issued by the U. S. Census office in 1916. They are now available.—Ed.]

Occupational Mortality. Dublin² studying occupational mortality through an analysis of 94,269 deaths of workingmen insured by the Metropolitan Life Insurance Company arrived at certain interesting conclusions. The several hundred occupations reported on covered practically the entire field of skilled and unskilled labor. Being a study of occupational mortality only, conclusions as to occupational morbidity, occupational hazards (not fatal) and other conclusions as to occupation save those directly related to mortality are not justified.

The percentages of the total of some of the more important causes of death are:

Tuberculosis of the lungs.....	20.5
Organic disease of the heart.....	12.
Bright's disease	9.6
Accidental violence	9.3
Pneumonia	7.2
Apoplexy	6.2
Cancer	4.9

To determine the susceptibility of a given occupation the death-rate of the occupation from that disease was divided by the death-rate from that disease of all laborers. For instance, the death-rate of blacksmiths from 25 to 34 years of age from consumption was 28.7. The death-rate of all males from the same disease in the same age period was 40.9. We conclude that blacksmithing is not a very hazardous occupation as compared with other labor as regards consumption since 28.7 divided by 40.9 gives 70.2.

The occupations in which consumption was most frequent were: clerks, bookkeepers and office assistants, death-rate 35 per cent. In the age period 25 to 34 the tuberculosis death-rate in this group was 51.2. The index is, therefore, 125 (51.2 divided by 40.9).

(2) Amer. Jour. Pub. Health, July, 1916.

The tuberculosis index was also found high among compositors, printers, teamsters, drivers and chauffeurs. Miners were found to be but slightly subject to it—5.8 per cent. of all deaths at all ages and 11.9 per cent in age period 25 to 34, index 29. The largest death-rate among miners is from accidents, 20.3 per cent. Dublin suggests that one reason for the low percentage of total deaths among miners from tuberculosis is the high percentage of fatal accidents. Another reason is the high percentages of acute and chronic bronchitis, 3.1 per cent., and pneumonia, 10.3.

Railway employees have a fatal accident rate of 42.4 and a tuberculosis rate of 14.

Saloonkeepers and bartenders have an alcoholism rate of 3.4. Other death-rates among this group are, cirrhosis of the liver, 7.5; Bright's disease, 12.2. Adding these three together we find that for age 35 to 44 they are responsible for a mortality of 233.5. The mortality for all occupied males in the same age period is 12.5; therefore, the index for saloonkeepers and bartenders for alcoholism, all forms, is 189.

Next in importance to tuberculosis as a cause of death among working men is organic heart disease. It is responsible for 12 per cent. of all deaths. In age 65 and over it is reasonable for 20.4 per cent. of all deaths. It is also the leading cause of death in ages 55 to 64. It is the most frequent cause of death among farmers and farm laborers, the index being 133.

Suicide is most prevalent among cigar makers, saloonkeepers and bartenders, machinists, railway engineers and trainmen. It is lowest among coal miners, laborers and textile mill-workers.

The index for accidental violence among railway engineers and trainmen, age 25 to 34, is 461.6. In age period, 55 to 64, the index is reduced to 263.1.

The only occupational poisoning occurring with sufficient frequency to figure in these statistics is lead poisoning; 2 per cent. of all the deaths were due to lead poisoning. In age period 35 to 44 the percentage was 3.4. Painters, paper-hangers and varnishers had the greatest hazards from this disease.

[These very valuable statistics illustrate many good

points, but, at the same time, they direct attention to two shortcomings. At the same meeting of the American Public Health Association as that at which this paper was read, Dr. Haven Emerson discussed the unreliability of the cause of death as shown by the death certificate. Certain causes of death listed in the International Classification should not be accepted at all, certain other causes should not be accepted except where the diagnosis has been verified by certain prescribed laboratory and clinical tests and certain others only after autopsies.

Dublin suggests that the low death-rate of coal miners should be investigated. Wherever the death-rate from bronchitis is 60 per cent and that of pneumonia is 200 per cent of that from tuberculosis it is safe to say that a reasonable proportion of the causes of death given do not state the facts. The same statement holds true in even greater measure when we speak of diseases that are more taboo—for example, alcoholism and syphilis.

The second criticism relates to the impossibility of comparing hazards of different occupations without knowing the numbers employed at each occupation.—Ed.]

Work of Industrial Physician. The principal work of an industrial physician, says Farnum,³ should be fitting men to jobs. Careful physical examination shows that a very small proportion of workmen are free from all defects—somewhere between 1 and 12 per cent. On the other hand, the percentage of men whose defects render them unfit for any form of employment is likewise exceedingly small.

At the Avery Company there is an examination of every applicant for work and periodic examinations of those at work. There are frequent consultations between the foremen and the examining physician as to the capacities of individuals. Every employee who absents himself from work for any cause must see the physician before he is returned to work.

“What we are trying to do with our physical examination is to ascertain whether the individual man’s physical condition is compatible with the work that he is going to do. After he has been set to a certain job,

(3) Amer. Jour. Pub. Health, May, 1916.

if he has a defect of some kind, the physician counsels with him as to his defect and its influence on his work.

The system works. For instance, in the matter of accidents the members of eight defective groups have an accident rate only 0.8 per cent. higher than the average for all the factory. Among the men whose vision is five-tenths or less in one or both eyes there is a decrease of accident hazards of 2.5 per cent. as compared with the general rate for all employees. Among the group with heart lesions or a blood-pressure of 190 or over the accident hazard is 2 per cent. less than the general average. Those with hearing one-fifth normal or less had the same hazard rate as the average. The kidney disease and diabetes group had an increase of 3.5 per cent. over the average. The increase hazard over the average of the venereal disease group was 2.5 per cent.

Sanitation of Mines. The sanitation of coal camps is in advance of that of metal camps in the opinion of Lanza.* The chief hazard to health of a metal miner is poor ventilation. In coal mines the ventilation must be looked after or explosions are to be expected. The regular layout of coal mines assists ventilation. In metal mines the underground galleries are much more complex in their arrangement and ventilation is comparatively more difficult.

Lanza says that a temperature of 80 degrees moist bulb represents about the maximum at which men can do hard work on the basis of an eight-hour shift without danger to themselves or an impaired efficiency. In France the law limits the temperature to a maximum of 95, dry bulb, and 86, wet bulb. In Germany, whenever the temperature exceeds 80, wet bulb, the law shifts the day from eight to six hours. In New Zealand 80, wet bulb, is the top limit fixed by law.

Another danger is from gases and powder smoke. While consideration of these comes under the head of first aid, Lanza suggests the possibility of harm from the protracted inhalation of such gases in weak dilutions.

Another hazard is rock dust. It causes pneumoconiosis miner's asthma, miner's consumption and miner's roup and predisposes to consumption, in all probability.

(4) Amer. Jour. Pub. Health, May, 1916.

Lanza writes that in an investigation conducted by Mr. Higgins and himself and reported in Technical Paper 105, U. S. Bureau of Mines, it was found that there was an unusual amount of pulmonary disease among the miners in the Joplin, Missouri, zinc district. In the mines in this district there is an unusual amount of very hard and very insoluble flint (the silica content is over 95 per cent.) having very sharp edges. Exposure to this dust for a few years brings on cough, asthma, miner's phthisis and often consumption.

Housing in mining camps, especially when the company owns the houses, is better than the tenement housing of the cities.

Hookworm is somewhat prevalent in California mines and shows a tendency to spread to those of Arizona.

Miners' Nystagmus. Hoffman⁵ finds little evidence of miners' nystagmus in the United States. This is probably due to good hygienic conditions in certain directions as compared with conditions under which miners work in Europe. In the United States, mines are generally well lighted. Galleries are large and the men are not compelled to use a pick while lying in strained, unnatural attitudes. Much of the work is done by machinery.

In England in 1912 there were 29.8 cases of nystagmus for each 10,000 miners. In certain mining districts in Germany the rate is even higher. The causes of miners' nystagmus are as follows:

1. Inadequate light: Brown and Mackenzie found that 99 per cent. of the cases developed in miners who had been using the lock light. In the use of the lock light the miner stares into almost complete darkness. The average illumination of coalface where the open light (or cap lamp) was used was 0.09 foot candles as compared with 0.018 where lock lights were used. The illumination from a cap light is poor enough. That from a lock light is only one-fifth as good.

2. Errors of refraction: In 90 per cent. of cases of miners' nystagmus there are errors of refraction; 48 per cent. of the patients had either myopia, hyper-

(5) Bull. 93, U. S. Bureau of Mines.

metropia or mixed astigmatism; 27 per cent. had simple hypermyopia; 15 per cent. simple myopia.

3. Straining of the extrinsic muscles of the eyeball, the result of having the eyes fixed in a staring, strained position for long periods.

4. Neurotic temperament.

Llewellyn is quoted as giving the following symptoms of miners' nystagmus: "The first symptom is failure of sight, especially at night-time or when the sufferer is called upon to perform the more skillful portion of his work. The man next complains that the lamps dazzle his eyes and sooner or later that the maps and all surrounding objects dance before him. Headache, giddiness on stooping and exertion, inability to see at night and dread of a bright light are often present."

There are two distinct varieties of the disease. In the first the symptoms are absent or latent and the man suffering no disability is unaware that he has nystagmus. In the second the disease is manifest. The relative frequency of different symptoms in Llewellyn's 600 cases was as follows:

Movements of objects, 94.3 per cent.; headache, 84.5 per cent.; giddiness, 81.6 per cent.; night blindness, 76.5 per cent.; dread of light, 47.3 per cent.

Oxygen Deficiency. Burrell and Oberfell⁶ found that atmosphere deficient in oxygen begins to affect men when the proportion of that gas falls below 7.6 or 7.8 per cent. Mice and canaries are used in mines to test air for carbon monoxide since they are more susceptible to that gas than is man. They can not be used for testing oxygen deficiency because they are no more susceptible to such deficiency than is man.

Whenever, in entering a mine, the oxygen proportion is found too small to keep an oil-fed lamp burning there is grave danger from oxygen deficiency. The exploring party should not go on unless they are equipped with breathing helmets. The late effects of breathing air very low in oxygen are quite similar to those from breathing air over-rich in carbon monoxide. The tissues subjected to prolonged oxygen deficiency undergo severe damage.

(6) Technical Paper, 122, U. S. Bureau of Mines.

Foul Air Malaise. A disease or symptom-complex which he calls foul air malaise, is described by Taylor.⁷ The symptoms are:

(a) Acute and intractable dyspepsia: This symptom is always present. Nothing relieves it except change of air. Change of air causes striking and prompt relief of the symptoms.

(b) An anemia very similar to that of plumbism.

(c) Marked weakness, insomnia, anorexia, nausea and vomiting, irritability and malaise.

Taylor's experience with the disease was incident to practice in a colliery district.

The harmful gases in a coal mine are:

1. Marsh gas. Taylor says that miners' nystagmus occurs only in mines where there is marsh gas.

2. Deficiency of oxygen.

3. Carbon dioxide, while not poisonous of itself, is an index of the deficiency of oxygen.

4. Carbon monoxide.

5. Sulphuretted hydrogen.

6. Nitro compounds.

7. Unknown gases.

Special Diseases of Munition Workers. The Health of Munition Workers' Committee⁸ reports that the extensive manufacture of explosives and munitions has drawn attention to certain hitherto little known types of poisoning.

Symptoms of poisoning by nitro-nitro-toluol are drowsiness, frontal headache, eczema and loss of appetite. If the poisoning continues jaundice and death may ensue.

Manipulation of tetryl produces a light dust which causes eczema. Continued poisoning produces drowsiness, headache and lack of appetite. No fatal cases have come to the attention of the committee.

Inhalation for a long time of tetra-chlor-ethane causes drowsiness, loss of appetite, jaundice, coma and death.

Fulminate of mercury causes eczema and mercury poisoning.

To prevent poisoning the committee makes the follow-

(7) Med. Jour. Australia, Dec. 11, 1915.

(8) Medical Officer, May 13, 1916.

ing recommendations: Only healthy and temperate persons should be employed on this work. Workers should be supplied with half a pint of milk or cocoa before commencing work in the morning. Ventilation should be made especially good. Personal and factory cleanliness are important.

Illumination of Factories. An editorial in the *Lancet*⁹ comments favorably upon the "First Report of the Committee on Lighting in Factories and Workshops." The committee measured the lighting in 163 rooms of 37 factories determining the illumination in the workshops, corridors and entrances.

Where there is the best grade of top lighting the workshop illumination varies from 2 to 10 per cent. of the outside light intensity. With side windows 2 per cent. was the maximum illumination obtainable. The inside worker, then, works under conditions that make for eyestrain. The report indicates that headache, eyestrain and the necessity for using spectacles especially in certain processes such as embroidery, brass-wire weaving and tailoring is due to bad illumination.

The report shows that bad lighting increases the accident rate as much as 40 per cent.

Improved lighting is productive of cleaner surroundings. This is recognized in the legal requirements for well-lighted bakeries.

Improved lighting increases both the quality and quantity of work done. In one instance the earnings of the workers increased more than 10 per cent. after the installation of a better system of lighting.

Effect of Bichromate on Workers in Chrome Factories. Mitchell¹ has cared for the workers in a chromate factory for the past three years. He has made 846 examinations. The examinations were at the rate of 25 chrome workers a month; 175 cases of sore hands and fingers were found.

Twenty-five per cent. of those engaged in the chrome processes suffer constantly from lesions of this nature. One case of chrome hole in the foot was noted as was one case of severe conjunctivitis. The lesions are local

(9) Oct. 9, 1915.

(1) Jour. State Med., January, 1916.

and rather readily controlled. Of the 175 it was only necessary to suspend from work altogether 5 persons. It is usually sufficient to transfer a susceptible worker to another kind of work where he is free from the influence of chrome until his sores are healed.

Chrome causes a sluggish ulcer with clean cut, indurated edges and a punched out appearance. The bottom is filled with a scab. The ulcers are from $\frac{1}{8}$ to $\frac{1}{4}$ inches in diameter. They are found around the knuckles and the base of the nails, the legs, the external canal of the ear and the eyelids. The typical lesion is chrome hole through the nasal septum. The location of chrome hole is about a quarter of an inch from the lower anterior margin of the septum. The skin ulcers take place at points where there are breaks in the surface. The men most affected are those who work with the finished product or with the product in its final stages.

Causes of Death Among Boilermakers. The causes of death among the 66,000 members of the boilermakers' society were analyzed by Oliver.² Cancer is responsible for 4.54 per cent. of the deaths—a very small proportion. Accidents, principally in the two decades—20-40—cause 4.31 per cent. of the deaths. Deaths from heart disease lead with 15.33 per cent. This death-rate increases as age advances. Tuberculosis ranks second with a rate of 11.75 per cent. The tuberculosis rate begins to be high at age 23. It continues high until past age 50.

Pneumonia ranks third with a rate of 9.51 per cent. Kidney diseases cause 3.23 per cent. of the deaths.

Health of Female Employees of Department Stores. Mann³ gives some conclusions as to the health of department store women based on a year's experience in caring for the female employees of two large department stores.

In one establishment having 2,000 employees the average daily attendance at the hospital was twenty-six. In a month the hospital treats a number of employees equal to 40 per cent. of the total number of employees. From 40 to 45 per cent. of the ailments complained of could be prevented by a better understanding of, and care of the body; 37 per cent. of the cases cared for were cases

(2) Jour. State Med., January, 1916.

(3) Amer. Jour. Pub. Health, May, 1916.

of minor surgery; 17 per cent. were colds, nose and throat infections; 9 per cent. headaches; 7 per cent. indigestion; 8 per cent. eye and ear symptoms; and 6 per cent. dysmenorrhea.

In one store all applicants for positions had to stand a physical examination. Of the applicants 12 per cent. of the men and 15 per cent. of the women were rejected for incurable organic conditions. Nothing is gained by permitting an applicant to try to fill a job that he can not fill. Physical examination prevents misfits. For example, a girl with goiter should never be put on a job as errand girl or a man with heart disease installed as a floor walker.

An analysis of the symptoms complained of by 100 women who were examined showed as follows:

Periodic recurring headaches, 55 per cent.; stomach and bowel troubles, 57 per cent.; menstrual disturbance, 49 per cent.; leucorrhea, 29 per cent.

Nervousness, often complained of, Mann found upon investigation to be due to worry and fear.

Physical defects among the 100 were found as follows: teeth needing attention, 30 per cent.; heart murmurs, organic and functional, 14 per cent.; flat foot, 7 per cent.; weakened longitudinal arch, 28 per cent.; transverse arch gone, 92 per cent.

As to backs: good straight backs, 8 per cent.; fair backs, 7 per cent.; curvatures, 85 per cent.

Total that could be benefited by treatment or advice, 89 per cent.; total getting medical advice, 4 per cent.

A study of the habits of the female employees show that most of them sleep well. Few understand the principles of wholesome eating. Only 10 per cent. dance the new dances. Few get enough recreation. Many have serious home responsibilities. Only about 11 per cent. can be said to thrive in their occupation.

The department store girl is inactive. She walks about two miles a day as shown by pedometer and she stands the rest of the time in tightly fitting, poorly constructed corsets and high-heeled shoes.

Dr. Mann says our standard of the health of women is low. Perhaps the percentage of ill health and physical incompetency found in department store women is no

higher than among wives doing housework or women in the industries. Department stores are doing some work for the health of employees but it is palliative and not curative. They should educate in hygiene and right living. They should provide gymnasium facilities.

MILITARY HYGIENE.*

Hygiene in the Field. Dr. Alfred Soucek,¹ writing from the 'Austro-Russian front under date of March, 1915, points out that the approach of the warm season is certain to bring certain epidemic diseases, principally typhus and dysentery.

While vaccination and the prohibition of the use of unbottled water have stopped the outbreak of most epidemics there is danger in the use of raw butter.

Another danger lies in the latrines. Even the best built ones are not always used by the soldiers, due to a sense of modesty, or because they are not convenient, or because they are constructed in an unsatisfactory manner. To remedy this, Soucek has devised a transportable latrine which has proved of great value. It consists of a wood-lined wall 1.40 meters high and 0.50 meter wide to which two lateral walls of the same material 1.60 meters high and 0.60 meter wide are fastened with hinges. A board with seat-openings is hung between the lateral walls. To this is added a footboard instead of which a log may be used. This "closet" can be put up or removed and folded in a few seconds and meets the objections quoted above. The entire appliance is exceedingly cheap and easily constructed.

[Similar appliances have been in vogue in the U. S. Army for some time.—Ed.]

Another hygienic problem is represented by the railroad tracks near the railroad stations. The tremendous demand on railroads in the transportation of great masses of troops makes it necessary that trains remain

(*) In the preparation of this Section I have had the valuable assistance of Dr. G. M. Blech.—Ed.

(1) Der Militararzt, Vienna, July 17, 1915.

for prolonged periods in the vicinity of stations. The men utilize this period to satisfy calls of nature anywhere between or near the tracks so that in a short time excrement is seen dotting the ground for some distance. Though this area is very often cleaned and sprinkled with lime, enough time elapses to allow soiled water to run from the tracks into the ponds and wells. And these very wells yield to the traveling troops their supply of water. It is imperatively necessary that easily recognized latrines be established at these places in sufficient number.

Lice: The problem of destroying lice on soldiers in field hospitals has been solved by the author in the following simple manner. A mixture consisting of 2 parts bichloride of mercury, 500 parts oil of terebinth and 500 parts denatured alcohol is used. While the men thoroughly wash themselves and shave, their clothing, especially around the seams (*e. g.* the collar of the uniform) is sprinkled or brushed with this mixture, by means of a coarse brush. This procedure is to be repeated every other day for six days. The method is recommended for its simplicity and inexpensiveness.

Control of Lice. In a report on lice and lousiness at the western front, Peacock² reported that 95 per cent. of the men were infested with these parasites. The average number of lice per person was 30. When lice were found on one garment they were found on all. A shirt put on clean would be lousy in thirty minutes. Lice were found in the bedding but, generally speaking, the insects preferred to remain on the clothing. While the tents and dugouts harbored some lice the insects preferred to remain on the clothing when possible. Very much the most important source of infestation is infested men. The popular theory that infested buildings and bedding spread infestations was found to have little basis of truth.

The following report on insecticides is made: N. C. I. (naphthalene, 96; cresote, 2 per cent.; iodoform, 2 per cent., is the best all round insecticide). Dusting with this powder killed the lice and kept the clothing free for five days.

(2) Brit. Med. Jour., June 3, 1916.

Vermijelli was found very effective. The body is greased with it from neck to knees.

Crude oil ointment is made by taking 2 pounds of soft paraffin, melting it and adding 4 ounces of crude tar oil. This mixture used as an ointment was better as an insecticide than vermijelli. Used as a deterrent it was not so good as the N. C. I. powder.

An ointment made by incorporating N. C. I. powder in vermijelli was found very effective. N. C. I. and crude ointment was found most effective of all.

Mercury ointment was not very effective, nor was white mercury powder. Sulphur was almost a complete failure.

Thresh disinfectors using steam at 215° F. for three-quarters of an hour were found effective. Boiling water for five minutes killed both lice and eggs. Cresol solution, 1.5 per cent., for one hour was found effective against both lice and eggs. Chloride of lime, 7 per cent. solution, for 24 hours was effective. Alum, 10 per cent., for 48 hours was a failure as an insecticide.

Peacock advises issuing a pamphlet to the men on which the following advice appears:

Lousiness can be wholly prevented. The soldier himself is the main source of infestation. Whenever possible the clothing must be searched for lice and nits.

The white patch which covers the seam at the fork of the trousers should be removed. It is the favorite laying place. Eggs hatch in about one week. The trousers should be pressed with a hot iron once a week. This kills the lice and destroys the eggs.

About once in four days grease the perineum and neighboring parts with N. C. I. crude oil ointment and dust N. C. I. powder on all other parts of the body and legs.

Bathe frequently. Use N. C. I. powder on the blankets. Under-clothing should be boiled.

Bacot contributed the following points to the discussion. He found that head lice could be crossed on body lice. A male louse fertilized eighteen out of twenty-one females. Egg laying begins on the second or third day after fertilization. The laying of eggs continues so long as food supply is good and the temperature is warm. A female lays fertilized eggs for from sixteen to eighteen days after being separated from the male. The greatest number of eggs layed by a female under observation was 295—an average of 6.4 per day. The male lives about

thirty-two days after reaching maturity; the female, forty-six days.

The best temperature for louse life was found to be from 60 to 65° F. At 76° F. all insects died within five days and at 98° all died within three days. The first moult occurred on the fourth or fifth day, the second on the eighth and the third on the twelfth or thirteenth. At moulting and egg-laying time the insects try to hide away preferably in the seam in the fork of the trousers.

The eggs hatch from the seventh to the eleventh day but 56 per cent. hatch on the eighth day and thirty-three on the ninth. A single female may have 4,160 off-spring.

Kinloch added the following points to the discussion. Volatile oils such as oil of cloves, of bergamot and of turpentine, were not found very effective against lice. Neither were phenol bodies. Moore's powder—ammoniated mercury, 1 ounce; zinc oxide, $\frac{1}{2}$ ounce; magnesium silicate, $\frac{1}{2}$ ounce—was not effective. Various patent insect powders were found valueless. Fresh Dalmation insect powder had limited powers. The N. C. I. powder was found most effective of all. The only advantage of the iodoform in the powder was that it increased its adhesiveness. When magnesium silicate replaced iodoform the powder was just as effective, stuck just as well and was cheaper. Commercial naphthalene is more actively insecticidal than pure naphthalene. The best form to put the N. C. I. powder up in is a small sealed can.

The best gaseous disinfectant is sulphur fumes but these can not be relied on to kill all the lice in verminous clothing.

For the emergency cleansing of clothes soaking in petrol—kerosene—is best. For ridding the hair of lice and nits the best method is to go over it carefully with pieces of cotton moistened with tetra-chlor-ethane. While this is not quite so good an insecticide as trichlor-ethylene it is preferable because it is less irritating.

All things considered the best single louse insecticide is N. C. M. powder made as follows: Crude naphthalene 96 parts, cresote 2 parts, magnesium silicate 2 parts.

Temperature Necessary to Kill Lice and Other Insects. Bacot³ states that dry heat or submersion in water at 131° F. kills lice and lice eggs. This temperature must be maintained for 30 minutes. He, therefore, argues that it is not necessary to heat to the boiling point or to use boiling water as some have claimed 120° F. for 35 minutes did not kill lice or eggs; 122.3 killed most of the lice but not the eggs; 129.2 for 35 minutes killed both lice and eggs.

Bedbugs are killed by a temperature of 113° F. (Blacklock, 1912). Fleas and cockroaches are killed by the same temperature. Mosquitoes were killed by the same temperature (Yellow Fever Commission).⁴

The Struggle Against Mosquitoes. Hot summers are followed by so-called mosquito years, says A. Zucker,⁵ because these insects find the best conditions for abnormally large increase during very hot weather. In the European campaign the mosquitoes most frequently encountered are: *Culex pipiens*, *annulatus*, *nemorosus*, *cantans* and *Anopheles maculipennis*. Of these *Culex pipiens* is the smallest and most abundant. The larvae live by millions in stagnant water. The female deposits on an average of 300 eggs from which in four to five weeks mature females are produced. With the sting a secretion from the salivary gland is introduced into the wound. This prevents coagulation of the blood and through its content of formic and lactic acid produces an edematous swelling. The resulting disagreeable itching is due to the pressure from the edema of the cutis against the epidermis over it. The popular practice of crushing the mosquito at the place of the sting is wrong because the point of the proboscis remains in the wound producing still greater discomfort. Secondary infection of the raised skin not infrequently results in supuration.

Not all races are equally sensitive to mosquito stings, the blacks suffering least, the whites most.

There are several methods of overcoming the mosquito plague commonly known as the American, German and

(3) Brit. Med. Jour., Jan. 29, 1916.

(4) Kinlock: Brit. Med. Jour., June 19, 1915.

(5) Berlin klin. Wochenschr., Aug. 9, 1915.

English methods, each especially adapted to the conditions encountered in each country and which, if consistently carried out, produce good results.

Two main methods are recognized: (1) defensive measures such as mosquito-proof residences, veils, nets, etc.; (2) aggressive measures—covering of all pools of water; smoking out of all females; covering of water pools with crude oil; and cultivation of animals and plants antagonistic to mosquitoes.

Boerschman contended at the Fifth International Congress of Thalassotherapy that all our anti-mosquito methods, so far employed, are incomplete because they are based on our incomplete knowledge of the biology of mosquitoes. We will, therefore, have to figure on the presence of mosquito plague during hot summers and look to prophylactic and therapeutic measures.

The author divides these agents into two groups. In the first are placed all those which keep away mosquitoes. In the second, all which lessen the pain caused by the sting. The former are veils, free air draft, tar oils and insect powders.

Giemsa recommends a spray of:

Tinct. pyrethr. ros.	550
Potash soap	180
Glycerine	240
Tetrachlorid carb.	30

To be diluted with 20 parts water as a spray.

Hecker recommends a "fly paper" of:

Colophon	720
Castor oil	360
Honey	120

Furbringer recommends as a protective ointment:

Ol. carophyll	5-10
Lanolin	30
Ungt. glycerine	100

For hospitals smoking out with the following mixture is recommended:

Pulv. capsic.	400
Flor. chrysanthem.	200
Rad. valer.	200
Potass. nitr.	200

For 500 ccm. air space 100 grammes burned in shal-

low dishes is sufficient. After from two to three hours the rooms are opened and the mosquitoes are found dead or helpless. They are swept together and burned. This procedure, of course, is to be utilized only prior to the occupation of the rooms.

For the treatment of the bites washing with benzol has proved satisfactory.

Sterilization of Drinking Water With Chlorine. The first attempts to sterilize drinking water with chloride of lime were made as early as twenty years ago. The objections to the general introduction of this means of disinfection were the opposition to the use of chemicals and the difficulties in removing the odor and taste of chlorine.

According to Dr. Fritz Ditthorn⁶ the present war aroused a lively interest in methods of rapidly and certainly sterilizing drinking water. Large bodies of troops can achieve this by water-sterilizers-on-wheels, but a method which will enable every individual soldier to sterilize water for his own use is highly desirable. This applies especially to soldiers serving on detached duty, away from the main body, and compelled to utilize whatever well or surface water is available in the immediate vicinity. For such soldiers sterilization by means of calcium chloride opens a wide field and is of inestimable value. The difficulty, however, lies in the inability properly to preserve chlorine preparations.

Bayer and Co. have overcome this by manufacturing a suitable chlorinating preparation and a second preparation for dispelling the taste of chlorine—"Ortizon."

Method of application: 0.2 grammes of the chlorine preparations, corresponding to 0.14 effective chlorine, are added to 1 liter of water. If this is done in an open class vessel the water is stirred with a glass rod. If a bottle is chosen it is shaken a few times by turning it upside down. The water is next allowed to remain in contact with the preparation for ten minutes *precisely*. After that 0.4 grammes "Ortizon" is added and the bottle turned once or shaken. Oxygen is developed. Chlorine taste and odor disappear at once. The water appears slightly turbid and can be drunk after one to two

(6) Deutsche med. Wochenschr., Sept. 16, 1915.

minutes without previous filtering. Experiments with water taken from diverse sources and contaminated with cholera vibrios and typhoid bacilli have shown that the water is rendered sterile by the above method.

Lyster⁶ describes a method of treating water with hypochlorite available for soldiers in the field.

A waterproof, woven, flax bag, 20 inches in diameter and 28 inches long is used. At the top is a galvanized iron ring capable of folding at one diameter. To the ring rope is spliced at four points. By this rope and ring the bag is suspended. Five nickel spring faucets are placed at the bottom of the bag. The bag filled with water weighs 330 pounds. The bag empty weighs seven pounds.

The bag is filled with water and a tube containing a measured dose of hypochlorite is added. A package of 60 tubes weighs 10 ounces and measures $7\frac{1}{2} \times 3\frac{1}{2} \times 4\frac{1}{4}$ inches.

The hypochlorite makes a solution of 1 to 500,000. This is enough to sterilize water not grossly polluted. It kills all typhoid, dysentery organisms, amoebas and ciliates in from 10 to 30 minutes.

Sanitation in Camps. An exhaustive survey of modern facilities of insuring camp sanitation is contributed by Adam White⁷ and, while much of what he writes is common knowledge, certain ideas and suggestions merit review.

The presence of bodies of troops in camps living under canvas in open fields away from the sanitary facilities of civilized communities naturally raises certain sanitary problems.

Personal hygiene is, of course, an important factor and wise commanders insist on a neat appearance for each command for obvious reasons.

In camps without connection with a sewer system the disposal of waste water from kitchens, ablution places, baths, etc., is often a difficult problem, especially if the ground is not porous (as is the case in the huge concentration camp of the Illinois troops at Fort Sam Houston, Texas). A faulty disposal system produces

(6) Military Surgeon, March, 1915.

(7) Lancet, Jan. 8, 1916.

water-logging of the soil and fouling of the ground surface and this often to such an extent as to cause grave nuisance and probably injury to health.

From this it follows that unless absolutely forced by external circumstances no camping ground which is not porous should be chosen. Direct drainage into a stream is impracticable. Disposal of waste water can be accomplished in three ways—singly or combined—surface irrigation, sub-soil irrigation and disposal into soakage pits.

Before water is disposed of it should be freed as much as possible from its impurities, especially those which will increase the difficulties of disposal. This applies especially to grease (kitchen) and soap (bath-house).

Capt. G. M. Hamill has tried out the following scheme of separation of the water from gross impurities: The waste water from the ablution benches is led into a coke-breeze or sand filter grease trap, thence through a sedimentation pit, and finally through a second coke-breeze or sand filter. Before it reaches the first trap the waste is passed through a sieve made of perforated corrugated iron in order to keep back gross matter.

The filter traps are chambers made of wood well tarred and pitched, or of brick set in cement or puddled clay. The approximate size is 4 feet long by 2 feet, 6 inches wide, and 3 feet deep. There is a cross partition so placed that the trap is divided into two compartments, one being 3 feet long and the other 1 foot long. This partition reaches only to a point about 6 inches from the floor of the chamber so that the two compartments communicate at their lowest points. Both chambers are filled to within 6 inches of the top with coke-breeze or sand. For the ultimate disposal of the waste after its purification, the simplest method, is turning it into soakage pits. These should be made from 4 to 6 feet square, the depth depending on the distance at which a permeable stratum is reached.

Bathing Facilities. H. N. Goode^s describes the bathing and clothes disinfection provisions used by certain of the British troops stationed in northwestern Belgium.

The particular plant described cares for 2,000 privates and about 40 officers a day. The house is 50x50, one

(8) Lancet, Feb. 19, 1916.

story in height. Nearby is a 1,600 gallon water tank, 24 feet above the ground. The bathhouse is divided into entering porch, ironing room, undressing room, soiled clothes room, sprays for men, boiler room, sprays for officers, clean clothes room, issuing room, dressing room, exit porch.

The men are sent to the baths in batches of 75 every half hour. They take off their boots and puttees and enter the bathhouse in batches of 32. The boots and puttees are handed to attendants who pass them back as the men leave the building. The men then pass to the undressing room where they remove their clothing. The trousers and outer garments are ironed to kill lice and eggs. The trousers are usually put through a Thresh disinfecter where they are subjected to formalin at 216° F. for 20 minutes. Underwear is passed into the soiled clothes room. The men spend three minutes in the spray, two and a half for soaping and a half minute for washing off. The average amount of water used per man is one and a half gallons (a tub bath can not be taken on less than six gallons. Fifty gallons is the usual estimate for a tub bath.)

The men then pass out to the issuing room where they get fresh underwear. In the dressing room they find their tunics, puttees, boots, trousers and coats.

Both the undressing and the dressing rooms have tables with numbered spaces marked off on them. For example: Solider A leaves his outer clothes on Space 32 in the undressing room and finds it on the corresponding space of the dressing room table when he reaches that point.

As the exit is apart from the entrance the men pass through in endless procession without confusion.

The wash clothes are hauled away to a separate place to be laundered. Since water is scarce in that part of Belgium and the wash water would soon become offensive if discharged into surface ditches the used water is re-used. The tank is supplied by (1) a well, (2) roof water from the bathhouse, (3) treated wash water.

The soapy water from the baths is run into a mixing tank. Slaked lime is put into the tank and mixed by a mixer driven by a small windmill. The lime throws

down the soap as calcium stearates carrying down with it the dirt and impurities. The effluent runs through three brick concrete-lined settling tanks three, four and five feet wide respectively. Each is provided with baffles. All of the soap sediments out in the first two tanks. Into the third tank there is run a saturated solution of sodium carbonate. This separates out the lime salts and they fall to the bottom of the tank. The soluble oils are separated out also. They float on top of the water. This floating oil is absorbed out by canvas clothes fastened in the upper part of the tank.

From this settling tank the water flows into a charcoal filter where it is filtered through four inches of charcoal.

After being filtered the water runs to a well whence it is pumped to the tank. From the tank it runs to the heaters.

The first two settling tanks are cleaned every three or four days, the mixing tank daily. The treated water is clear, free from odor, and lathers well with soap.

Improvised Field Disinfection. Regimental surgeon, Dr. Sigmund Stassny, believes that the most rational method of ridding clothes of lice is live steam at 100° C. (212 F.) and higher, but the difficulty in the field lies in the inability to secure the necessary facilities. In generating steam in open kettles and conveying it into the clothes container one practically never gets the required temperature and pressure. Certain improvisations are possible only under favorable local conditions.

In the Southern battle area one often found an old "rakia" or brandy apparatus which rendered efficient service. When leaving the scene one invariably had to leave the valuable appliance behind and improvise another one at the next station, though this was not always possible because of lack of material.

Accordingly, the author came to the conclusion that it was best to take along a steam-producing apparatus and to utilize any old barrel as a container for the uniforms to be disinfected. There should be no trouble in obtaining the necessary firing.

The author purchased a "rakia" helmet (attachment

for the distilling apparatus) and an ordinary water boiler of suitable diameter. A tube to conduct the steam was fitted to the steam pipe of the attachment and suitably connected with the faucet of a 240 litre barrel. By loosening a hoop the bottom was removed and used as a top cover. An opening in the center of the cover

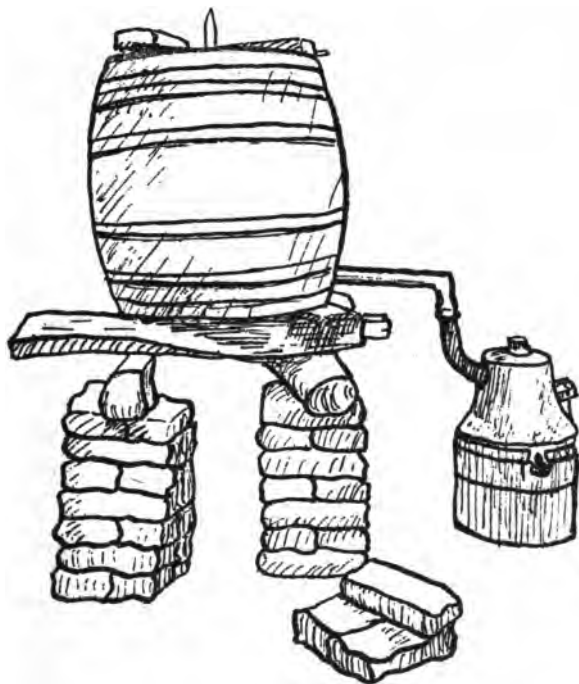


Fig. 12.

served to hold a thermometer in place. Any suitable support can be placed in the barrel to support uniforms and part of the personal equipment of the soldiers (*e. g.* haversack, canteen cover, etc.). Care should be taken that the cover fits tight and is held in place by heavy bricks. To prevent radiation of the heat the barrel can be covered by a blanket or similar object. To secure

a good fire a hole should be dug under the kettle. The entire appliance is portable (Fig. 12) and costs about \$10.

Prison Camps. B. W. Caldwell⁹ of the American Red Cross writes that probably the only emergency that was not carefully thought out and every detail arranged for by the general staff of the belligerent countries was the care and treatment of the prisoners of war.

The sanitary arrangements in the prison camps of Germany are as good as they can be under the circumstances, but they are far from being what they should. A sample menu is given in accompanying table:

MENU OF THE PRISONERS' KITCHEN AT CAMP ALTDAMM FOR THE PERIOD OF NOVEMBER 21 TO 27, 1916
(Translated from the original.)

Date—Day	Breakfast	Dinner	Supper	Daily Bread allowance
21, Sunday	Soy bean flour 30g. Tapioca flour 60g. Lard, 10g.	Fresh meat, 120g. Cabbage, 500g. Barley, 20g. Potatoes, 750g.	Corn meal, 75g. Marmalade, 50g.	300g.
22, Monday	Coffee, 2g. Coffee substitute (Mals kaffe), 30g. Sugar, 30g.	Soy bean flour 100g. Turnip root cabbage, 300g. Lard, 10g. Potatoes, 750g.	Corn meal, 45g. Cheese, 100g. Additional bread, 200g.	300g.
23, Tuesday	Soy bean flour 30g. Tapioca, 60g. Lard, 10g.	Salt meat, 120g. Cabbage, 500g. Barley, 20g. Potatoes, 750g.	Corn meal, 75g. Marmalade, 50g. Coffee, 2g. Coffee substitute (Mals kaffe), 3g. Sugar, 15g.	300g.
24, Wednesday	Coffee, 2g. Coffee substitute (Mals kaffe), 30g. Sugar, 30g.	Bloodsausage, 100g. Common (horse) beans, 130g. Lard, 10g. Potatoes, 750g.	Cheese, 100g. Corn meal, 45g. Potatoes, 650g.	300g.
25, Thursday	Corn meal, 75g. Sugar, 30g.	Cod fish, 100g. Fish roe, 100g. Turnip root cabbage, 200g. Potatoes, 750g.	Barley, 30g. Soy flour, 30g. Lard, 10g. Potatoes, 400g.	300g.
26, Friday	Corn meal, 20g. Common beans, 70g. Lard, 10g.	Fresh meat, 120g. Cabbage, 500g. Barley, 200g. Potatoes, 750g.	Cheese, 100g. Tapioca, 20g. Lard, 5g. Potatoes, 650g. Coffee, 2g. Coffee substitute, 3g. Sugar, 15g.	300g.
27 Saturday	Coffee, 2g. Coffee substitute (Mals kaffe), 3g. Sugar, 30g.	Salt meat, 120g. Soy beans, 150g. Potatoes, 750g.	Herring, 125g. Corn meal, 30g. Lard, 5g. Potatoes, 750g.	300g.

The most trying disease among the prisoners is tuberculosis. In some camps the morbidity from this disease reaches 2.5 to 3 per cent. More deaths among the prisoners are due to this disease than to all others combined.

Typhus has made its appearance in two or three of the

(9) Public Health Journal, April 1916, and Military Surgeon, March, 1916.

camps. In one camp in which there were English, French and Russian prisoners, some of the latter brought in typhus, about 800 of the prisoners became infected and 300 died. This epidemic was stopped at once when the commander was shown his authority, and measures for control were inaugurated.

Cholera has been introduced into camps several times, but it has always been controlled with ease. There has been very little insanity. In one camp where there are 48,000 prisoners there have been only three cases of insanity in ten months.

The provisions for kitchen sanitation and garbage disposal are very good.

The prisoners are required to be very careful of their clothing and their persons. Both the laundry facilities and the bath facilities are excellent.

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